Occupational Earnings and the Returns to Medical and Other Professional Training, 1967- 1977

Final Report

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IDES

INSTITUTE FOR DEMOGRAPHIC AND
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by

Stephen P. Dresch
Institute for Demographic and Economic Studies
210 Prospect Street
New Haven, Connecticut 06511
203/432-4366

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ABSTRACT

This study provides a detailed examination of physician practice earnings, by specialty, in comparison to earnings in other occupations. Recognizing that gross earnings comparisons may seriously distort true interoccupational differences in economic rewards when earnings differentials compensate for other differences between occupations, the analysis incorporates adjustments for interoccupational differences in (a) schooling and other training costs (including foregone earnings), (b) time devoted to professional activity and (c) observable individual characteristics (especially age and labor force experience).

The analysis of occupational earnings in calendar year 1977 leads to the clear conclusion that, adjusting for interoccupational differences in the various indicated dimensions, earnings in medicine were quite high relative to earnings in all other occupations. As an order of magnitude, the differentially high earnings of physicians were equivalent (in constant 1972 dollars) to a life annuity paying between $3,000 and $15,000 in each year after age 18. Differently stated, the real rate of return to investment in a medical career was at least 12 to 16 percent.

Examination of earnings changes over the decade 1967 to 1977 revealed that earnings in virtually all other professional occupations had declined, especially after 1972. In contrast, evidence of an increase in physician earnings possibly as great as 75 percent (1967 to 1977) was found. Health professionals other than physicians represented the only other professional group exhibiting significant earnings growth over this decade.

By comparison to general practice, physician specialization was also found to be generally profitable in 1977. This was especially true of the surgical specialties, in which earnings differentials were equivalent to life annuities of between $3,000 and $9,000 per year, corresponding to a real internal rate of return at least as high as that associated with basic medical training. Pediatrics was found to be the only specialty in which adjusted earnings were significantly lower than earnings in general practice.

Having found substantial evidence of a significant component of pure economic rent in physician earnings, the market conditions confronting the individual practitioner and giving rise to these supranormal earnings were explored. By comparison to incumbents in other occupations, physicians were found to confront extremely inelastic demands for their services, permitting substantial price discretion with only attenuated consequences for the quantity of services demanded. Again, surgical specialists were found to confront especially low elasticities of demand. This finding of very low elasticities of demand for the services of individual practitioners suggests that even relatively slight increases in competition might result in significant reductions in physician fees and earnings.

SUMMARY

1. THE ECONOMIC AND PUBLIC POLICY SIGNIFICANCE OF INTEROCCUPATIONAL EARNINGS DIFFERENTIALS

While medical practice is commonly perceived to be a highly remunerative profession, and despite the fact that this perception is supported by descriptive data generally available concerning physician earnings, the issue of the degree to which the economic status of physicians actually exceeds that of persons in other professions has been a subject of recurrent debate in the economics and public- policy literatures.

Most briefly stated, gross interoccupational earnings differentials may provide very inaccurate indices of the relative economic positions of different professions when other differences between the various professions are taken into account. Thus, by comparison to others, one profession may require, e.g., a prolonged and expensive period of training and the devotion of long hours to arduous professional labor, and any observed difference in earnings between this and other occupations may serve only to compensate practitioners for these greater pecuniary and nonpecuniary demands. In this event, earnings differences between professions are "equalizing" rather than the reverse; a reduction in earnings in the higher- earning profession would place incumbents in that profession in an inferior position relative to others.

If all professional and related markets, including the markets for occupational preparation (schooling and training), were perfectly competitive, then any observed interoccupational earnings differences could be assumed to be compensatory and equalizing; otherwise rates of entry into the higher-earning profession would rise until earnings and other conditions of employment had deteriorated, on balance, to levels observed elsewhere.

Obviously, however, all relevant markets are not perfectly competitive. In fact, in many professions competition is severely constrained, generally as a result of direct or indirect intervention by the state. Thus, public provision of and/or control over schooling may result in a limitation of schooling opportunities relative to the demand for schooling, licensure laws may restrict access to professional practice to those who have completed particular courses of training and have met specified (although possibly arbitrary and irrelevant) standards, particular rights and privileges (e.g., the right to prescribe certain controlled substances or to perform particular procedures) may be unnecessarily restricted to incumbents in selected occupations entry into which is restricted, direct or indirect control over the individual practitioner may be vested in organized representatives of the profession, either directly (as in the case of state- sanctioned agencies of "selfregulation") or indirectly (as in the vesting of control over the right

to admit patients to a public or voluntary hospital in representatives of already affiliated practitioners), etc. Under these circumstance there is no a priori justification for the interpretation of observed interoccupational earnings differentials as equalizing or compensatory.

While the true economic significance of observed interoccupational earnings differences may be ambiguous, their interpretation is of great public policy significance. This is especially the case with reference to the medical profession. State and, to a lesser extent, federal actions constitute the primary determinant of the supply of opportunities for medical education and of the terms on which medical education is acquired; if the apparently high earnings of physicians are not equalizing, this would provide a strong justification for significantly reducing subsidies to medical education. Similarly, federal and other third- party policies concerning the reimbursement of hospital costs serve to influence if not determine the remuneration of persons engaged in graduate medical training (internships and residencies); redefinitions of reimbursable costs could greatly increase the costs and/or reduce the supply of training opportunities. Because of the increasingly important role of government in the financing of medical care, direct public control over the earnings of medical practitioners has been the focus of increasing legislative and administrative interest, while the consequences of particular public policy interventions may depend critically on the true sources of observed, ostensibly excessive physician earnings. Finally, proposals for enhanced competition in medical markets, i.e., for reducing the anticompetitive powers of governmental and quasigovernmental (e.g., practitioner) agencies, as a device by which to restrain the growth of medical care costs will depend for their effectiveness on the actual existence of a significant component of monopoly rent in current physician earnings.

The principle purpose of this study is to contribute to the understanding of the sources and signficance of observed physician earnings relative to earnings in other professional occupations.

2. ABSENCE OF EVIDENCE THAT HIGH PHYSICIAN EARNINGS ARE COMPENSATORY

To test the hypothesis that observed "supranormal" physician earnings simply serve to compensate physicians for the expense of their prolonged training and for the arduousness of medical practice, earnings of physicians and of incumbents in 21 other professional, technical and managerial (PTM) occupations were subjected to detailed examination. Specifically, within each occupation the relationship between earnings and such factors as (1) hours devoted to work, (2) professional experience, (3) schooling and (4) location was estimated. On this basis a lifetime earnings profile for the representative incumbent in each occupation was derived, indicating the mean earnings which he would expect to receive in each year of his working lifetime. Earnings in each year were then adjusted for hours- of- work differentials between occupations, and the present value of the representative incumbent's expected lifetime earnings, net of schooling costs (including foregone earnings), was derived, with appropriate adjustments for prospective mortality. For each occupation the difference between this present value and the mean present value for all PTM occupations was converted to an "annuity

equivalent," i.e., to that life annuity (expressed in constant 1972 dollars), payable in each year after age 18, which the observed differential in lifetime earnings would purchase. These annuity equivalents, incorporating adjustments for interoccupational differences in the costs of training and in subsequent work effort, provide an index of the relative profitability of alternative occupations.

The results of this examination are entirely consistent with the hypothesis that a substantial element of pure economic rent is incorporated in physician earnings. In 1977 the adjusted present value of expected lifetime earnings of physicians exceeded that of incumbents in any other occupation, possibly by as much as 50 percent. Expressed as a post- age- 18 life annuity payable in constant 1972 dollars, the excess of the representative physician's earnings over those of the average professional, technical or managerial worker was equivalent to an annual annuity payment of between $5,000 and $15,000.

Perhaps more importantly, the statistical evidence indicates that the absolute economic status of physicians improved substantially over the decade 1967 to 1977, while that of incumbents in virtually all other professional, technical and managerial occupations deteriorated, especially after 1972. Nonphysician health professionals (dentists, podiatrists, etc.) constituted the only other professional occupation in which significant increases in adjusted earnings were observed over this decade.

The relative, adjusted economic statuses of the various occupations (as measured by the implied annuity equivalents) are portrayed in Table 0.1 for the years 1967, 1972 and 1977. That table, however, fails to indicate the extreme degree of the developing gap between physicians and other health professionals, on the one hand, and other professions. Thus, from a 1967 position of virtual equality with lawyers, even on the basis of the most conservative evidence the annuity equivalent of physicians was more than twice that of lawyers in 1977, and may have been substantially greater yet. Similarly, the annuity equivalents of nonphysician health professionals, which in 1967 had been less than 60 percent of those of lawyers, exceeded lawyers by more than 100 percent in 1977. Essentially, earnings in the other professional and related occupations declined significantly, and converged, over the decade, while earnings of health professionals, physicians and nonphysicians alike, increased even more dramatically. Thus, even adjusting earnings for differences in the costs (including time) required for education and training and for time devoted to professional activity, the investment in physician training was quite profitable in the 1960s and has become even more so subsequently.

While basic physician training is found to be highly (almost undoubtedly inordinately) profitable, physician specialization and especially surgical specialization is comparably profitable. Thus, by comparison to general practitioners, adjusted present values of expected lifetime earnings of surgical specialists are generally 10 to 40 percent greater. In terms of annuity equivalents, the surgical specialist's differential earnings are worth between $3,000 and $10,000 per year (constant 1972 dollars). Pediatrics is the only specialty in which adjusted earnings are significantly below those of general practice. Adjusted present values of expected lifetime earnings and associated annuity equivalents, by specialty, are presented in Table 0.2.

TABLE 0.1

Occupational Rankings by Annual Annuity Equivalents, 1967-1977

	1967	1972	1977
Extremely High (>$3,000)	Physicians Lawyers	Physicians Lawyers	Physicians Oth. hlth. prof.
Very High ($2,000/$3,000)	Oth. hlth. prof.	Oth. hlth. prof. Architects	Lawyers
High ($1,000/$2,000)		Librar., soc. sc. Bank officers Oth. man., admin.	Bank officers
Mean (-$1,000/$1,000)	Oth. man., admin. Engineers Librar., soc. sc. Life, phy. sc. Trade managers Writers et al.	Math. spec. Accountants Engineers Hlth., ed. admin. Writers et al. Life, phy. sc. Computer spec. Trade managers	Engineers Librar., soc. sc. Oth. man., admin. Math. spec. Architects Hlth., ed. admin. Accountants Computer spec. Trade managers Life, phy. sc.
Low (-$2,000/-$1,000)	Accountants Public admin. Oth. tech. Eng., sc. tech.		Writers et al. Eng., sc. tech. Public admin.
Very Low (-$3,000/-$2,000)	College faculty Hlth. tech.	Oth. tech. Public admin. Eng., sc. tech. College faculty	College faculty Oth. tech. Teachers
Extremely Low (< -$3,000)	Teachers Clergy	Hlth. tech. Teachers Clergy	Hlth tech. Clergy

TABLE 0.2

Physician Specialty Adjusted Lifetime Earnings and Annuity Equivalents

Specialty		PV_A	Ratio to GP	AN_A	PV_U	Ratio to GP	AN_U
Neurological surgery	(S)	$620.4	1.33	$8711	$622.0	1.30	$8144
Orthopedic surgery	(S)	601.4	1.29	7629	$604.8	1.27	7163
Cardiology	(M)	592.5	1.27	7147	595.1	1.25	6637
Opthalmology	(S)	588.6	1.27	6907	580.4	1.22	5794
Otololaryngology	(S)	555.5	1.19	5054	548.7	1.15	4019
General surgery	(S)	539.2	1.16	4156	539.8	1.13	3531
Obstetrics/gynecology	(S)	528.2	1.14	3535	533.3	1.12	3167
Radiology	(H)	502.4	1.08	2094	500.9	1.05	1351
Allergy	(M)	501.3	1.08	2029	490.4	1.03	760
MEAN		499.1	1.07	1906	499.9	1.05	1293
Pathology	(H)	498.0	1.07	1838	504.4	1.06	1543
Dermatology	(M)	497.7	1.07	1828	481.7	1.01	270
Internal medicine	(M)	487.6	1.05	1256	491.4	1.03	812
Urology	(S)	477.8	1.03	711	478.6	1.00	100
General practice	(M)	465.2	1.00	0	476.9	1.00	0
Gastroenterology	(M)	465.0	1.00	-8	472.2	0.99	-264
Psychiatry	(M)	454.5	0.98	-601	445.7	0.94	-1699
Anesthesiology	(H)	447.6	0.96	-985	447.1	0.94	-1699
Pediatrics	(M)	412.4	0.89	-2948	413.6	0.87	-3534

Note: PV_A, PV_U denote present values of lifetime earnings, adjusted (A) and unadjusted (U) for hours- of- work differences, in thousands of constant 1972 dollars.

AN_i denotes annuity equivalent, by comparison to general practice, corresponding to PV_i, in constant 1972 dollars.

(S), (H) and (M) denote surgical, hospital- based and medical specialties, respectively.

3. POLICY IMPLICATIONS

The findings of this study provide substantial support for proposed policies which would reduce subsidies to medical training and specialization and which would attempt to reduce levels of physician fees and earnings. Because physician earnings do appear to incorporate a large element of pure rent, interventions could be implemented in such a manner as to significantly reduce expenditure on physician services and yet avoid undesirable responses (e.g., increases in numbers of procedures performed in order to offset reductions in compensation per procedure).

Perhaps the most interesting and potentially important finding of the study is that the market confronting the individual medical practitioner is indeed extremely noncompetitive. Evidence concerning the elasticity of demand for the practitioner's services (i.e., the degree to which increases in price result in declines in patient demands for services) indicates that the physician's demand is highly inelastic. While this inelasticity permits the physician to charge high fees and secure supranormal earnings, it also offers substantial scope for indirect but potentially highly successful and socially beneficial intervention into the market for physician services. Specifically, this finding indicates that even relatively modest public policy actions designed to foster competition among physicians (or between physicians and other potential suppliers of medical services) may have very significant consequences for physician fees and earnings. Had the individual physician been found to be in a highly competitive environment (*vis- a- vis* other physicians), with high earnings due only, e.g., to entry barriers, then attempts to increase competition would have little immediate effect. In fact, it appears that even small, incremental movements to reduce institutional constraints on competition between physicians may lead to marked reductions in fees and in the economic rents incorporated in physician earnings.

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PART 0

INTRODUCTION

The whole of the advantages of the different employments of labour and stock must, in the same neighborhood, be either perfectly equal or continually tending to equality... This at least would be the case in a society where things were left to follow their natural course, where there was perfect liberty, and where every man was perfectly free both to chuse what occupation he thought proper, and to change it as often as he thought proper...

Pecuniary wages and profit, indeed, are every-where in Europe extremely different according to the different employments of labour and stock. But this difference arises partly from certain circumstances in the employments themselves, which, either really, or at least in the imaginations of men, make up for a small pecuniary gain in some, and counter- balance a great one in others; and partly from the policy of Europe, which no-where leaves things at perfect liberty.

Adam Smith (1776, p. 99)

Chapter 1

THE MARKET CONTEXT OF OCCUPATIONAL CHOICE, LABOR SUPPLY AND EARNINGS

1.1 THE CONCEPT OF LABOR SUPPLY IN A MARKET FOR PROFESSIONAL SERVICES

In the neoclassical economic representation of the market for human services, labor, measured in standard, time- defined units, is sold at a fixed, market-determined price, the wage rate. Equilibrium in the labor market is then defined as a state in which the quantity of labor supplied by workers is equal to the quantity of labor demanded by producers at the prevailing wage rate.

In the stylized but frequently- employed single- commodity, two- factor model of the economy, this conception of the labor market is quite powerful, notwithstanding its simplicity. Most importantly, it permits the derivation of the relationship between factor prices and marginal productivities and of the distribution of income between factors of production. However, in its application in more disaggregated, microeconomic contexts, substantial elaborations of the basic model are necessary if important aspects of economic reality are to be captured. Thus, quite significantly for present purposes, it has been necessary to recognize efficiency differences between time-denominated units of labor, developing a measure of labor defined in terms of "efficiency units." However, the essential model is left unchanged. Specifically, the basic model remains one in which labor supplies and demands are equated in a competitive market, in which labor supply is determined by individual preferences (marginal utilities of liesure and of purchased

commodities) and in which labor demand is determined by productivity (values of marginal products, or, in the case of imperfectly- competitive output markets, marginal revenue products).

It is on this basic model of the labor market that contemporary human capital theory has been grafted. In its simplist form human capital theory simply introduces one source (of possibly many) of efficiency differences between otherwise comparable units of labor. In what can be characterized as the "labor- augmenting" human- capital model, more human- capital- intensive labor is simply more efficient (constitutes a greater number of efficiency units of labor per unit of time) than less human- capital- intensive labor. Per efficiency- unit of labor supplied, wages of labor are independent of the amount of human capital embodied by the labor supplier; per time- defined unit of labor, however, the more human- capital- intensive laborer receives a wage which is higher in proportion to his higher productivity. A more elaborate model of the relationship between human capital and production recognizes human- capital- intensive labor as qualitatively distinct from "raw" labor, i.e., as a "third factor" in production, with the underlying production function exhibiting less than perfect substitutability between more and less human- capital- intensive labor.[1]

Maintaining intact the basic representation of a competitive labor market, equilibrium conditions for the labor market can be utilized to derive equilibrium conditions for investment in human caapital. In the labor- aumenting model, human capital investment will continue up to the point that the cost of a marginal increment in human capital is just equal to the additional earnings (productivity) attributable to that increase in human

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[1] These alternative models of the relationship of human capital to production and an examination of their implications are presented in Dresch (1977).

capital. If all individuals are equally efficient human- capital investors, then in equilibirum all labor will embody identical quantities of human capital; individual differences in efficiency in human capital formation will imply corresponding differences in degrees of human- capital intensity. In the third- factor model earnings differentials in equilibrium will just compensate the marginal individual in the more human- capital- intensive segment of the labor market for the cost of his human capital investment; if all individuals are equally- efficient human- capital investors, then each individual will be indifferent between the alternative segments of the labor market, while differences in human- capital- formation efficiencies will result in economic rents to inframarginal individuals in the human- capital-intensive segment of the labor market.

At a relatively high level of abstraction this basic human- capital-augmented labor market model, in both variants, remains quite powerful. Thus, for example, it provides the basis for an overall conception of the economic role of education and of other forms of human capital formation and of the economic significance (or lack of significance) of human- capital- related differences in labor earnings. However, its relevance to an understanding of the realities of a highly- differentiated labor market is severely limited. This is due in part to the fact that the underlying model is essentially static, ignoring processes of change in technology and in the composition of labor demand and failing to explicitly recognize the time- dimension of human capital formation and utilization. As importantly, however, the underlying assumptions of the basic model, and the assumption of perfectly competitive markets (for human capital, for labor and for output) in particular, may bear very little correspondence to reality. On both counts, significant

modifications and extensions of the basic model are required if it is to illuminate the realities of the contemporary labor market, including the markets for medical and other professional services.

1.2 THE MARKETS FOR PROFESSIONAL LABOR AND FOR PROFESSIONAL SERVICES

All labor demands constitute derived demands, dependent upon underlying demands for the outputs of labor (and other) inputs. However, in the usual representation of the labor market, the linkage between the demand for output and the demand for labor input is only indirect and impersonal. The supplier of labor is aware only of the demand of employers for labor; more specifically, the laborer knows only the wage rate offered by employers for labor posessing specified characteristics. Similarly, for the employer little about the laborer is relevant other than his efficiency in production. While the output of the employer- producer may be differentiated from that of his competitors, except in specific circumstances (e.g., in the case of the retail establishments offering a particular class of service to customers), the differentiation of output is generally unrelated to individual differentiations in labor input.

Perhaps the most significant characteristic of the markets for professional services and for professional labor is that the relationship between the demand for output (service) and the demand for professional labor derived therefrom is quite direct and explicit. As Friedman and Kuznets (1945) observed, in the case of the independent professions the professional practitioner appears simultaneously as entrepreneur, as principle supplier of labor to the firm and as human capital investor. While the direct relationship between service demand and the demand for labor is most obvious

in the case of independent professional practices, even in the case of employed professionals this link is more direct and explicit than in the usual model of the labor market.

The situation of the professional practitioner is essentially defined by the fact that the service cannot be isolated from the supplier of the service. Services of different professional practitioners are differentiated simply by the fact that they are provided by different individuals. All of the characteristics of the practitioner are reflected, in a manner of greater or lesser importance to the consumer of the service, in the nature of the service itself. Thus, the market for the individual practitioner's services is by definition a monopolistically- competitive market. This fact greatly complicates the characterization of the demand for professional labor.

Strictly speaking, the demand for labor in this context becomes indeterminate. Assuming for the moment that the practitioner is inextricably tied to a given "employer" (possibly himself), the situation is in fact one of bilateral monopoly: The practitioner is the sole seller of his service, while the firm is the sole buyer (and simultaneously the sole seller of the service to "ultimate" purchasers). Although the obvious solution (for levels of output and service prices) is one of joint maximization, the distribution of net revenues between the firm and the pracititioner is indeterminate.

The "joint- maximization solution" is effectively definitional in the case of the independent practitioner, in which the firm and the practitioner are one and the same entity. However, the nature of this particularly simple case suggests the probable _de facto_ character of the more general practitioner- firm relationship. If the practitioner is viewed as selecting among competiting firms, the function of which is (a) to purchase his labor

services and (b) to sell his differentiated professional services, then the situation in effect becomes one in which the practitioner is for all practical purposes independent. In his role as entrepreneur he is simply selecting optimal levels of inputs other than his own labor, given the demand for his service by purchasers and the characteristics of the production function. In short, the situation is one of individual practitioner maximization, subject to (a) a given demand function for his service output, (b) his work- liesure preferences and (c) the characteristics of supply of other inputs (including those of the "employing" firm). Under these circumstances there is no "professional wage rate" but rather a marginal revenue product function subject to which the practitioner maximizes his welfare.

Human capital can be introduced into this system through its effect either on the efficiency of the practitioner as a producer of services or on the demand function for these services. Thus, an incremental investment in human capital might result in an increase either in output at any level of input or in price at any level of output.

Given these relationships, it is possible to specify equilibrium conditions for interoccupational earnings and for occupation- specific human capital investment. Thus, conditional on choice of an occupation the optimal level of investment in human capital can be determined, with investment in human capital proceeding to the point that the marginal revenue product of human capital equals its marginal cost. Given the optimal level of human capital for each occupation, in equilibrium interoccupational earnings differentials would just render the marginal entrant into any occupation indifferent between that occupation and at least one other.

Empirical identification of any equilibrium state in this type of system would be somewhat problematic. Because of differences in production functions of and demand functions for the individual practitioners' services, within and between occupations, marginal revenue product functions might vary markedly. Due to these differences, levels of human capital investment and of time devoted to service provision might also differ significantly, notwithstanding the existence of an equilibrium state; such differences would be compensated, for marginal individuals, by offsetting differences in total earnings. Depending on the elasticities of demand and on the shape of the production function, individuals would be distributed systematically over occupations on the basis of unobserved characteristics of their utility functions in the earnings- work/liesure space. Thus, individuals for whom the disutility of work rose most rapidly would be concentrated in occupations in which, *ceteris paribus*, production functions exhibited relatively low elasticities of output with respect to practitioner input and/or in which service demand functions exhibited relatively low price elasticities.

The situation becomes even more complex when external constraints on occupational and related (e.g., human capital investment) choices are recognized. Thus, for example, monopoly or collusive oligopoly in the supply of education (or other human capital formation activity) and occupational licensure and other entry restrictions imposed by similarly collusive professional associations and unions, enforced in each case by legal sanctions, may result in interoccupational earnings differences which are difficult to distinguish from those which are simply compensatory for other differences in occupational characteristics. Thus, equilibrium in this type of differentiated labor- *cum-* service market becomes a very ellusive concept.

Notwithstanding the treacherousness of the terrain, however, there are substantial reasons for attempting to identify the degree to which markets of this type have equilibrated, especially in light of the pervasiveness of external (e.g., public policy) constraints on market functioning.

1.3 PUBLIC POLICY, OCCUPATIONAL BEHAVIOR AND EARNINGS

While an understanding of the processes by which differentiated and differentially- interrelated labor markets achieve equilibrium and of the characteristics of that equilibrium would be of interest in any event, the fact that public policy interventions significantly influence both the processes and characteristics of market equilibration provides a compelling justification for a serious examination of the markets for professional labor and professional services. Thus, public policy is influential in determining the conditions of supply of education and training, criteria for entry into practice, and constraints on the market behavior of practitioners. Moreover, having determined, to a large extent, the nature of the supply of professional labor and services, public policy appears again as a significant direct or indirect influence on the demand for professional services. To a high degree this involvement in demand is a result of the necessity to compensate for the influence on supply, specifically as constraints on supply are reflected in the level and structure of prices and in the differential consumption of professional services on the part of different groups of consumers.

Together, public policy influences on the demand for and the supply of professional services largely determine market outcomes, including earnings of practitioners, levels of consumption of professional services by different classes of consumers, and the private and public costs of professional

services. An understanding of these market outcomes, therefore, may contribute significantly to the evolution of public policy.

This characterization of the influence of public policy is especially descriptive of the market for medical services. On the one hand, public policy has virtually defined the role of the physician vis a vis other suppliers of medical services, has determined the supply of physician training (pre- and post- graduate) and has stipulated and/or enforced constraints on the market actions of medical practitioners (relating, e.g., to price determination, advertising and utilization of other medical services). On the other hand, public policy has served to determine the demand for physician and other medical services, either indirectly (e.g., through the tax treatment of expenditures for alternative types of medical and related services) or directly (e.g., through direct subsidies to consumers and through direct public supply of particular classes of medical services).

It is beyond the scope of this study to consider in detail the justifications and rationalizations which have been offered for public policy influences on the supply of medical services. Clearly, however, public policy interventions have served to restrict supply and to reduce competition among practitioners, creating the conditions which have called forth public policy interventions which have been designed to influence demand. Together, policies influencing supply and demand have served largely to determine the level and configuration of medical services consumed and the level and structure of practitioner prices and earnings.

Especially in light of the influence of policy constraints on conditions of medical service supply, it is critical that demand- influencing policies take into account the unique characteristics of the market for medical

services. This is not simply "another market" providing services the demand for which is of public policy interest. Any attempt to augment or influence the structure of demand must consider characteristics of supply and the determinants of ultimate market outcomes.

Specifically, it is possible that, in the context of constraints on supply, efforts to influence demand may simply result in changes in levels of practitioner prices and earnings, with little ultimate impact on the level or even composition of consumption. Recognizing the likelihood of this outcome of public policy action, an increasingly common component of public intervention has been the attempt to constrain practitioner pricing and related decisions. Movement in this direction, however, requires a degree of knowledge of actual and potential market outcomes unnecessary in the case of interventions into more conventional markets. It becomes necessary not only to guage current market outcomes (e.g., identify elements of economic rent in practitioner earnings) but also to anticipate responses to variously specified constraints on practitioner behavior.

The primary purpose of this study is to provide a detailed assessment of current market outcomes, identifying differentials in returns to alternative occupational investments. Such information constitutes a _sine qua non_ for any effort to constrain practitioner behavior and reduce levels of economic rent in particular occupations and occupational specialties. Beyond simply documenting differentials in returns and the existence of economic rents, however, the study attempts to identify conditions of demand confronting the individual practitioner which, in the first instance, make possible the command of these economic rents. These conditions of demand will reflect underlying constraints on the market functioning and will provide the focus

for and determine the effects of public policy interventions designed simultaneously to alter the level and composition of consumption and to avoid increases or achieve reductions in levels of economic rents.

PART I

CONCEPTUAL FRAMEWORK AND THEORETICAL ISSUES

After ten years of work on earnings functions, all we have is a dim light at the end of a tunnel: everyone has been wrong and everyone has been right because the problem has proved to be more complicated than was originally imagined.

Mark Blaug (1976, p. 845)

Chapter 1

WORK EFFORT AND RETURNS TO OCCUPATIONAL CHOICE

1.1 THE ISSUE OF WORK EFFORT, OCCUPATIONAL CHOICE AND BEHAVIOR

Even before the proliferation of studies of the returns to occupational choice under the rubric of contemporary human capital theory, as grounded in the work of Mincer (1958), Schultz (1960) and Becker (1964), professional practice was recognized as a distinct and possibly unique subject of microeconomic study. As already noted, as early as 1945, Friedman and Kuznets portrayed the economics of independent professional practice as an intersection of the theory of the firm and of labor economics, with the professional practitioner simultaneously playing the roles of entrepreneur, of principle supplier of labor to the firm, and of human capital investor. However, because interest has focused primarily on the human capital investment aspects of professional training, the analytical complexity and richness associated with this juxtaposition of roles generally has not been recognized or exploited in the literature.

With the notable exception of Reinhardt (1975), who was concerned with the composition of nonprofessional inputs into professional (medical) practice, previous studies have been preoccupied with the estimation of returns to professional training and the choice of a professional career. Fundamental to such estimates is the concept of the "earnings function," relating earned income to its determinants. From a very simple formulation, on the basis of which rates of return to schooling could be directly derived,

theoretical development especially and empirical application to a lesser extent have involved the progressive generalization of the earnings function to incorporate such complex factors as, e.g., postschooling investment in and obsolesence and depreciation of human capital.

Variations in work effort have provided a relatively recent focus of interest in this context. Adjustments for these variations, however, have been grafted rather simplistically onto the existing earnings function analyses, without concern for such potential complicaions as, e.g., systematic variations in income-leisure preferences, the possible nonlinearity of the relationship of earnings to hours of work and the effects of age and experience on the returns to work effort in alternative occupations.

These lacunae in the analysis of returns to occupational choice as modified by variations in work effort provide the primary motivation for the present study. The conceptual importance of accounting for hours of work differentials in assessing returns to human capital investment was first stressed by Lindsay (1971), who demonstrated that, on the assumption that leisure is a normal good, the observed income differential associated with a human capital investment overstates the return to that investment. This is true because the investment serves to increase the wage rate (price of leisure), thus inducing a substitution of work (and hence consumption of purchased goods and services) for leisure. Some fraction of the income differential then represents not a return to the human capital investment per se, but rather compensation for the additional work effort induced by the increased wage resulting from the investment.

The empirical significance of the adjustment of earnings differentials for variations in hours of work has been demonstrated by Eckaus (1973),

examining returns to years of schooling, and Lindsay (1973), focusing on returns to physician training. Sloan (1976) has seriously questioned Lindsay's conclusion that medical training represents, at best, an only marginally profitable investment if appropriate adjustments for work differentials are made, arguing that this result derived from a substantial overestimate of physician hours relative to hours of work in comparison occupations. However, the basic thrust of Lindsay's argument has been generally accepted. Thus, for example, Sloan and Feldman (1977) have incorporated an hours-of-work adjustment in applying Rosen's (1977) human capital model to the estimation of the rate of return to medical training.

1.2 THE CONCEPTUAL COMPLEXITY OF HOURS- OF- WORK ADJUSTMENTS

As Lindsay has observed, the adjustment of earnings for differences in work effort across occupations inevitably confronts what is essentially an index number problem. Assume that the wage rate (per hour) is higher in occupation i (e.g., medicine) than in comparison occupation j (e.g., college teaching) and the observed hours of work are also higher in i than in j.[1] If the returns to occupational choice i are estimated on the basis of an upward adjustment of earnings in j by the ratio of hours in i to hours in j (a Paasche index), then real returns will be unambiguously overestimated, while a Lespeyre index (adjusting earnings in i downward by the ratio of hours in j to hours in i) will generally underestimate returns.

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[1] Although the latter is not a necessary consequence of the former, as, for example, if the individual labor supply function is backward-bending (the income effect of the higher wage rate outweighs the substitution effect), it can be demonstrated that the relationship between the wage rate and hours of work is necessarily positive if all labor-cum-human- capital markets are in long-run equilibrium (in which case there is no income effect).

Even apart from this complexity, however, the adjustments proposed by Lindsay and employed, e.g., by Eckaus, Lindsay and Sloan and Feldman, effectively rest on several highly restrictive but implicit assumptions. Specifically, the proportionate adjustment of earnings requires the assumptions that

1. the number of hours worked is freely variable by the individual, i.e., institutional rigidities do not constrain the amount of time devoted to work;
2. relative hours worked in alternative occupations do not vary systematically over the working lifetime;
3. individual preferences for income versus leisure do not differ systematically across occupations; and
4. the wage rate is (a) given and (b) constant, i.e., earnings are a linear function of hours worked, with equality of the average and marginal wage rates.

If any one of these assumptions is violated, the conventional adjustments for interoccupational hours of work differentials are inappropriate.

With reference to medical practice and to a range of reasonable comparison occupations the first assumption, of freely variable hours of work, is probably not unreasonable, although constraints may be encountered in particular employment settings. However, if the employment setting is itself subject to choice, if the option of a setting in which hours are variable is available, and if intraoccupational markets are in equilibrium, then no qualification is required in this dimension.

The second assumption, of lifecycle-constancy of relative hours in the alternative occupations, is implicit in the utilization of mean hours, uncontrolled for age or experience, in the available empirical estimates of the hours adjustment factors. Given the inversely exponential weight associated with differential earnings accruing further in the future, an

observed mean differential in hours will have a greater effect on returns the greater the degree to which it is concentrated in the early phase of the working lifetime. This effect, however, will not be be reflected in the adjusted estimates available in the literature. Superfically, it might be thought that use of age- or experience-specific hours-of-work adjustments would have only second-order consequences for estimated returns. However, if the lifecycle profile of work effort (and as discussed below, of returns to work effort) varies significantly across occupations, the effects may indeed be substantial. Moreover, if age-experience distributions of personnel differ markedly across occupations, then significant differences in observed mean hours would be consistent with identical lifecycle profiles of work effort, raising the possibility that the conventional mean-hours adjustments incorporate serious biases.

The third assumption, of the absence of systematic variations across occupations in preferences in the income-work (leisure) space, is also subject to serious question. Specifically, an earnings differential which would just compensate one individual for the cost of a human capital investment which increases his wage rate will imply a surplus for an individual whose marginal disutility of work rises less rapidly with an increase in hours. Thus, interpersonal variations in the disutility of work will be reflected systematically in occupational choices. As a result, adjustments of earnings for hours differentials across occupations will result in biased estimates of real earnings differentials. If all labor-cum-human- capital markets were in perfectly-competitive, long-run equilibrium, then the marginal entrant into any occupation would be at least as well off in that occupation as in any other, and only inframarginal individuals would receive rents, although

positive or negative net returns might be indicated by the conventional hours-adjusted earnings differentials. However, if restrictions on entry into alternative occupations exist, then these conventional adjustments might disguise the existence of substantial rents even at the margin if preferences differ significantly across occupations.[2]

The final assumption, of a constant marginal (equal to average) wage, is highly suspect, especially in the independent or quasi-independent professions. This assumption rests on a conception of a market in which labor, in time-defined units, is exchanged for earnings at a fixed wage rate, implying that earnings are a strict linear function of the number of units sold. In fact, earnings in many occupations are a complex function of own time and other inputs subject to individual control. While this is explicitly the case in independent practice, e.g., in medicine or law, even in many ostensible "employee" situations this variable marginal earnings characterization often applies, at least in the intermediate run.[3]

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[2] It is not obvious, a priori, that systematic differences in preferences which would be observed in the absence of entry restrictions would also be observed in the face of such restrictions. This would be the case only if selection criteria for rationed entry were correlated with individual income-leisure preferences. However, if the "gate-keepers" act so as to maximize the aggregate real rents to the occupations members, then they will systematically select entrants on the basis of these preferences. The same effect may be achieved indirectly. Thus, if the probability of obtaining entry is contingent on, e.g., academic performance, if academic performance is a function of time devoted to study, and if time devoted to study is associated with or reflects the marginal disutility of work, then successful applicants for entry will, on average, exhibit lesser disutility associated with work than will unsuccessful applicants or non-applicants.

[3] For example, earnings of academic faculty might be a linear function of publications, measured, e.g., in pages. But if pages produced per hour decline with increases in hours, then the marginal wage rate of the academic will decline and will be less than his average wage rate.

Several sources of a declining marginal wage rate can be suggested. First, individual efficiency may decline with an increase in hours of work, as reflected in a declining marginal product of labor. Second, observed total earnings may incorporate a significant fixed component, or rent, independent of hours of work and output. This would be the case, for example, in a group practice in which the earnings of a senior member include an essentially fixed element based upon the earnings of the group as a whole, or in an institutionally-based practice in which a salary or retainer is supplemented by fees for services provided. On either of these counts, the average wage rate would decline with increases in hours, lending a downward bias to hours-adjusted estimates of interoccupational earnings differentials.

A third source of average-marginal wage differences emerges when earnings are recognized as a function not only of own time but also of other inputs. If these other inputs are perfectly divisible and freely variable at fixed market prices, then variations in the marginal wage rate will be observed only if the production function, relating "output" (gross income) to inputs, exhibits increasing or decreasing returns to scale or is nonhomogeneous with respect to some or all inputs. If, in addition, markets for other inputs are imperfectly competitive, i.e., if the quantities of these inputs can be increased only at increasing prices, or alternatively, if these inputs are subject to indivisibilities, then net income might well rise more or less than proportionately with increases in hours.

Finally, if the market for the individual's output (services) is imperfectly competitive, then the marginal revenue product of hours of work will decline even if none of the factors discussed above serves to introduce a discrepancy between marginal and average wage rates. Consider, for example,

an extreme case in which the production function exhibits constant returns to scale with respect to hours, but the elasticity of demand is (minus) unity; in this case the marginal wage rate would be zero at all levels of hours. In general, the marginal wage will decline more rapidly, the lower the elasticity of demand.

The possibility of inequality of average and marginal wage rates and of systematic interoccupational variations in utility functions and in lifecycle patterns of work effort casts serious doubt on the validity of available estimates of returns to professional training and specialization. However, any attempt to incorporate these considerations into empirical analysis must confront a number of difficult theoretical and statistical issues, as discussed in the following chapter and in the appendices to this study.

Chapter 2

MEASURING THE RETURN TO OCCUPATIONAL CHOICE

2.1 THE NATURE OF AN OCCUPATIONAL INVESTMENT AND THE APPROPRIATE MEASURE OF THE RETURN

Internal rates of return represent the most commonly presented measures of the gains or losses associated with occupational choice. However, because occupational choices are exclusive, discreet and noncontinuous, these measures can be argued to be of little relevance. The internal rate of return, in other words, is appropriate only in the context of continuously variable investment, in which case the rational individual will invest up to the point at which the marginal internal rate of return is equal to the interest rate available on alternative investments involving comparable risk.

A more appropriate measure of returns in the present context is provided by the capital value of the choice of occupation i over occupation j, i.e., by the present value of all earnings differentials between occupations i and j. This represents, in effect, the initial wealth an individual would be willing to sacrifice in order to obtain title to the occupation i rather than occupation j earnings; if negative, this capital value is the increment in initial wealth which would compensate the individual for the foreclosure of occupation j and forced entry into i.

In general, capital values of and internal rates of return to occupational choice will lead to qualitatively similar conclusions concerning the relative desirability of alternative occupations. However, in many

circumstances internal rates of return will provide a highly distorted picture. Thus, earnings in one occupation may be slightly above earnings in another at all points in the working lifetime, while the costs of occupational entry (time and out-of-pocket costs) may be identical. Under these circumstances, the net internal rate of return to the choice of the first occupation will be infinite, although the capital value (while positive) may be small.

This type of distortion will be particularly serious in any comparison of three or more occupations. For example, if the costs of entering the first of the above occupations rather than a third alternative are high, the internal rate of return to that choice may be relatively low, although the net capital value may be high. Thus, if the two alternatives were ranked according to their desirability relative to the first, the internal rates of return would indicate that the first was vastly superior to the second but only somewhat superior to the third. In fact, as indicated by the capital values, the first is only marginally preferrable to the second but substantially better than the third. In short, a relatively lower rate of return on a large investment is preferrable to an extremely high (even infinite) return on a small (or zero) investment. This is precisely why the internal rate of return is misleading as an indicator of returns to occupational choice, where investments are discrete and discontinuous.

Competitive equilibrium in the labor and professional services markets can be easily defined in terms the capital values of occupational choices. Discounting appropriately defined net earnings differentials (as discussed below) at a rate equal to the interest rate which could be earned on alternative investments of comparable risk (as also discussed below), a

competitive equilibrium relationship between earnings in any two occupations will exist when the net capital value of the choice of either over the other is zero. Hence, the magnitude of the net capital value (positive or negative) is an indicator of the degree of departure from competitive equilibrium, indicating the existence of either (a) temporary disequilibrium or (b) departures from the perfectly competive norm. Thus, estimates of net capital values represent the point of departure for further analysis, not the conclusion of the analysis. Only if the net capital values (plus or minus a reasonable margin of error) are found to be zero is there nothing else to explain. The finding of substantial net capital values requires that an explanation for the departure from competitive equilibrium be sought.

2.2 ELEMENTS IN THE DERIVATION OF NET CAPITAL VALUES

In order to compute the capital value of the choice of one occupation over another, it is necessary to specify (1) the precise monetary streams to be discounted, (2) the period over which these streams are to be evaluated, (3) the appropriate treatment of mortality differentials, and (4) the discount rate.

2.2.1 Definition of the Earnings Streams

In this study, in which the focus is on returns to professional training, the relevant streams are either earnings or earnings net of out-of-pocket schooling costs (positive or negative). In the first case, the result is an estimate of the gross capital value of the occupational choice; in the second the net capital value is estimated. Note that out-of-pocket schooling costs do not include foregone earnings (already incorporated in the gross capital

value estimates, as discussed below) but do include (with positive signs) tuition, fees, books, supplies, etc., and (with negative signs) scholarships and fellowships, grant-equivalents of educational loan subsidies, etc. If the net social (rather than private) capital value were to be determined, all subsidies to schooling would be included in the measure of out-of-pocket schooling costs. With several important exceptions, relating to the effect on net private capital values to a shift of "full cost" tuition and the elimination of schooling related subsidies, the present analysis is restricted to private out-of-pocket schooling expenses as conventionally defined.

In principle, net private capital values should be determined by discounting posttax earnings differentials, while net social capital values would discount pretax earnings differentials. On the basis of substantial evidence (Pechman and Okner, 1974) that, at upper income levels, average effective income tax rates are remarkably invariant with respect to income, the present analysis utilizes pretax earnings. Because of the invariance of the average effective tax rate, this will affect only the magnitude, not the sign, of the estimated net capital values, and market equilibrium will still be indicated by a zero net capital value associated with the choice of any one occupation over any other. The appropriate margin of error around zero will, of course, be magnified (by the reciprocal of one minus the tax rate).

2.2.2 Definition of the "Working" Lifetime

The period over which earnings net of out-of-pocket schooling costs are discounted is defined to include the schooling period. Because the focus here is primarily on professional occupations, broadly defined, a minimum of high school graduation is assumed in all occupations. Therefore, in the

interoccupational analysis earnings net of schooling costs, commencing at age 19, are discounted to age 18, the assumed age of high school graduation.

Discounting earnings in the alternative occupations to a common age explicitly takes into account foregone earnings costs associated with the choice of one occupation over the other: If it is assumed that prior to the completion of the schooling or training period, earnings are in fact zero, i.e., if $Y_{Nia} = 0$ for all $a \leq L + F_i$, where F_i is the years of schooling required after age L (the lower-bound of the working lifetime, e.g., age 18) for entry into profession i, then differential foregone earnings associated with the choice of profession i over profession j will have been incorporated in the estimates. Also, since foregone earnings differentials have been taken into account, in the absence of subsidies no adjustment of the resulting estimates is required for room, board and other living costs over the schooling or training period. Thus, as discussed above the net capital value of the choice of i over j can be obtained simply by deducting from the gross capital value only the present value of the differential costs of schooling per se (out-of-pocket costs of tuition, fees, books, etc., net of grant aid). To the degree to which room and board costs are subsidized, of course, the present value of these subsidies should be treated as a negative cost of schooling.

In principle, the issues raised by differential patterns of retirement across occupations should be addressed. If retirement represented a purely voluntary action, with reference to which external forces were neutral, then the issue of retirement would become a special case of the larger issue of the determination of work effort (hours of work) discussed previously. Clearly, however, retirement is not invariably voluntary, and external constraints are greater and more prevalent in some occupations than in others.

Fortunately, as a practical matter these issues can be sidestepped since their resolution will have little impact on the resulting estimates. Discounting earnings differentials to age 18, the weight given to earnings at more advanced ages is extremely small, especially when mortality probabilities are taken into account. For example, with a discount rate of five percent, a one dollar difference in earnings at age 70 would have an age 18 present value of only eight cents, and if the survival probability is, e.g., 0.75, this would be reduced to six cents. Thus, the net capital value estimates are dominated by earnings differentials at younger ages, rendering the estimates quite insensitive to variations in the terminal year or the precise treatment of retirement probability differentials. For present purposes, a retirement age of 70 is assumed for all occupations.

Since variations in hours of work, over occupations and, within occupations, over the lifecycle, are taken into account, with hours asymptotically approaching zero with increases in age in most occupations, and in light of the freedom available in most professions to continue active practice to extremely advanced ages, the most legitimate treatment would be to ignore retirement altogether and to take into account, in addition to the occupation-specific age-hours relationship, only the effects of mortality. Given the low weights attached to earnings at advanced ages, this is the procedure which, *de facto*, has been employed.

2.2.3 Incorporation of Mortality Adjustments

Mortality differences themselves, however, raise serious issues. While mortality rates are generally significantly lower in professional occupations than for the population at large, great differences are observed across

professions. For example, age-specific death rates of physicians are almost 80 percent greater than those of college faculty, at least between the ages of 25 and 65. The critical issue is whether these occupation-specific mortality adjustments should be incorporated in the estimation of returns to occupational choice. If the entire difference in mortality experience were attributable to occupation per se, then this would be an appropriate procedure. However, to a greater or lesser extent these differences in mortality experience undoubtedly reflect the selection or self-selection into occupations of persons with occupation-independent mortality probabilities which differ systematically from those of the population at large and from those of entrants into alternative occupations.

If in fact ex ante mortality probabilities differ significantly across entrants into alternative occupations, then it is probably also the case that mortality expectations of marginal entrants into an occupation will tend toward those of the population at large. Because occupations differ in the lifecycle profile of earnings, it is clearly necessary to adjust expected future earnings for survival probabilities, but the derivation of appropriate survival probabilities is ambiguous.

For the representative incumbent in an occupation, the issue is one of ex post occupational versus ex ante selection differences in mortality/survival prospects. At one extreme, if observed interoccupational differences in mortality are causally related to occupation, then lifecycle earnings in each occupation should be adjusted for that occupation's mortality experience. If the effects derive entirely from selection into alternative occupations of persons with systematically different mortality prospects, then the returns to the choice of occupation j over i for a j incumbent should be estimated on the

basis of earnings in both i and j adjusted for j mortality. For the marginal entrant, if the observed mean differentials are due to selection, while the marginal entrant's prospects converge toward those for the population, an occupation-independent adjustment would be appropriate.

2.2.4 Specification of the Discount Rate

Finally, the issue of the discount rate must be considered. The capital value of the choice of occupation i over occupation j for a person graduating from high school at age L is simply

$$C^{n}_{ij} = \sum_{a=L+1}^{U} (S_{iLa}\, \hat{Y}''_{Nia} - S_{jLa}\, \hat{Y}''_{Nja})\, (1 + i)^{-(a - L)} \qquad \text{(I.2.2.1)}$$

where $L + 1$ is the lower bound on the working lifetime,

U is the upper bound on the working lifetime,

S_{iLa} is the probability that an occupation i incumbent will survive from age L to age a,

$\hat{Y}''_{Nia}$ is the predicted nominal net earnings of an occupation i incumbent at age a, appropriately adjusted for hours of work differentials between occupations i and j (as discussed further below) and in the case of net values also incorporating (negatively the net out-of-pocket costs of schooling required for entry into occupation i, with $\hat{Y}''_{Nja}$ defined similarly,

i is the nominal discount rate, and

C_{ij} is the estimated nominal capital value of the choice of i over j.

If inflation at an annual rate d is anticipated to be observed over this individual's lifetime, then the real capital value of the choice of i over j is

$$(I.2.2.2)\quad C^r_{ij} = \sum_{a=L+1}^{U} (S_{iLa}\, Y'_{Nia} - S_{jLa}\, Y'_{Nja})\,(1 + r)^{-(a - L)}$$

where $Y^r_{Nia} = Y''_{Nia}\,(1 + d)^{-(a - L)}$,

r is the real discount rate, and

C^r_{ij} is the estimated real capital value of the choice of i over j. However, if the real and nominal interest rates are appropriately defined, i.e., if

$$(I.2.2.3)\quad (1 + i) = (1 + r)\,(1 + d) = 1 + r + d + rd \simeq 1 + r + d,$$

$$\text{and } i = r + d + rd \simeq r + d,$$

then the nominal and real capital values will be equal. In short, the capital value of the choice of occupation i over occupation j will be invariant with respect to the rate of inflation because the nominal discount rate varies by definition with the rate of inflation.

Thus, if the individual is age L in some year t_0, then it is necessary only to predict earnings in constant (year t_0) dollars as long as an appropriate estimate of the real interest rate is employed in estimating the capital value of the choice of occupation i over j.

In fact, earnings in each occupation at each age for an individual of age L in year t_0 will be predicted on the basis of observed earnings of incumbents of each age a in year t_0, i.e., on the basis of cross-sectional observations of earnings as a function of age. These observations, however, are not predictions of real earnings which will be

observed in the future because they do take into account secular real earnings growth, i.e., increases over time in the real earnings of persons of all ages. Thus, if the predicted earnings of a person of age a in year t_0 are $\hat{Y}_{Nia(t_0)}$, then the predicted earnings of a person of age a in year t_1, will be

$$(I.2.2.4) \quad \hat{Y}'_{Nia(t_1)} = \hat{Y}_{Nia(t_0)} (1 + g)^{t_1 - t_0}$$

For a person of age L in year t_0, $t_1 - t_0 = a - L$. Thus,

$$\begin{aligned}
(I.2.2.5) \quad C_{ij} &= \sum_{a=L+1}^{U} (S_{iLa} \hat{Y}'_{Nia} - S_{jLa} \hat{Y}'_{Nja}) (1 + r)^{-(a - L)} \\
&= \sum_{a=L+1}^{U} [S_{iLa} \hat{Y}_{Nia}(1 + g)^{a - L} - S_{jLa} \hat{Y}_{Nja}(1 + g)^{a - L}] (1 + r)^{-(a - L)} \\
&= \sum_{a=L+1}^{U} (S_{iLa} \hat{Y}_{Nia} - S_{jLa} \hat{Y}_{Nja}) (1 + g)^{a - L} (1 + r)^{-(a - L)} \\
&\simeq \sum_{a=L+1}^{U} (S_{iLa} \hat{Y}_{Nia} - S_{jLa} \hat{Y}_{Nja}) (1 + r - g)^{-(a - L)}
\end{aligned}$$

Thus, defining what Tobin (1971) has characterized as the income rate of interest, ρ, as the real interest rate, r, minus the anticipated rate of secular real income growth, g, then the estimated capital value of the choice of occupation i over j, utilizing cross-sectional observations of earnings as a function of age and discounting at the income rate of interest, will equal the capital value that would be derived utilizing actual predictions, real or nominal, of future earnings, and discounting at the appropriate real or nominal discount rate.

In summary, since the capital values of occuational choice derived here will be based on cross-sectional relationships between earnings and age, the conceptually appropriate discount rate is the income rate of interest, i.e., the real interest rate minus the rate of secular real income growth (the rate

at which the cross-sectional age-earnings relationships are shifting upward over time).

While emphasis legitimately should be placed on the estimated capital value of the choice of occupation i over j, estimates of internal rates of return can also be derived. In assessing these estimates, however, it is necessary to compare them to an independent estimate of the income rate of interest. Thus, the income internal rate of return estimated on the basis of cross-sectional observations of earnings as a function of age will be that value of $\rho (= r - g)$ for which the capital value C_{ij} in equation I.2.2.5 is zero. The corresponding real internal rate of return will equal the estimated income rate of return plus the anticipated rate of secular real earnings growth. Thus, although the internal rate of return can be computed without considering the rate of secular earnings growth, interpretation of the resultant estimate requires that the rate of secular earnings growth be incorporated.

The question of the appropriate magnitude of the discount rate can be decomposed into two components. First, what is the magnitude of the real interest rate confronting the individual? Second, what is the appropriate adjustment for anticipated secular earnings growth? With reference to the first of these questions, the general answer is either (a) the rate at which the individual can borrow in order to undertake the human capital investment necessitated by the choice of a professional career or (b) the rate he can expect to earn on some alternative investment of comparable risk. The theoretical issues associated with variations in risk across occupations are considered in an appendix. For present purposes alternative occupations will be considered equally risky and attention will be focused on comparably risky nonoccupational investment alternatives.

In the absence of legal-institutional constraints on the capital market, the rate at which an individual could borrow to finance an investment would equal the anticipated rate of return on that investment (ignoring transactions costs). In fact, the functioning of the capital market is constrained, especially in the financing of "unsecured" investments, e.g., human capital, by such legal provisions as the prohibition of involuntary servitude (and associated bankruptcy laws). Thus, the rate of interest at which an individual can borrow may well depend critically on the source of funds and may vary significantly over individuals and over amounts borrowed. For example, the (implicit or explicit) rate at which an individual can borrow within the family may be substantially less than the rate at which funds can be acquired from external sources, and some individuals will enjoy greater access to intrafamily funds than others.

Because there is no necessary barrier in principle to improved capital market functioning, as discussed at length in Dresch (1982), the present analysis relies primarily on estimates of returns on comparably risky non-human-capital investment alternatives.

The appropriate adjustment for anticipated secular real earnings growth is more speculative. The adjustment suggested by Tobin (1971), the rate of productivity growth in the economy at large, is clearly excessive, since it is due in part to a shift in the composition of the labor force toward occupations with higher earnings. A more appropriate measure would be provided by direct estimates of the rate of secular upward shift in age-earnings profiles, an approach which will be employed in a subsequent study. For present purposes, reasonable bounds on the rate of real secular earnings growth will be employed.

Appendix A

MODELLING THE DETERMINANTS OF HOURS, EARNINGS AND THE RETURNS TO OCCUPATIONAL CHOICE

A.1 A GENERALIZED LIFECYCLE MODEL

In principle, occupational choice and the lifecycle profiles of professional hours of work and earnings must be viewed as simultaneously determined to maximize expected lifetime utility subject to occupation- specific production, demand and supply function constraints. A point of departure is provided by the model developed by Reinhardt (1975, Appendix B), although it is necesary to extend and recast that model within a lifecycle framework.

Assume that a professional enters practice at time t_0 and has a maximum life expectancy of t_n. At time t ($t_0 \leq t < t_n$) he confronts a demand function for his services of the form

$$(\text{I.A.1.1}) \quad P_t = P\,(Q_t;\, X_t,\, Z_{1t},\, Z_{2t}),$$

where P_t is the price received per unit of professional service rendered,

Q_t is the quantity of service provided,

X_t is a vector of variables describing consumers and characteristics of the market.

Z_{1t} is a vector of the professional practitioner's characteristics not subject to his control, e.g., age, and

Z_{2t} is a vector of demand-influencing professional characteristics which are subject to the practitioner's control (as discussed further below).

The demand function is assumed to have the usual properties; specifically, it is assumed that $\partial P_t / \partial Q_t \leq 0$. By convention, controllable professional characteristics will be defined so as to have positive effects on price, i.e., $\partial P_t / \partial Z_{2t} > 0$. Uncontrollable characteristics may have either positive or negative effects on price, and furthermore, the signs of these effects may change over time.

The production function for professional services can be expressed generally as

$$Q_t = Q\,(H_{pt},\ K_t;\ Z_{1t},\ Z_{3t}), \tag{I.A.1.2}$$

where H_{pt} denotes time devoted by the practitioner to professional practice ,

K_t is a vector of inputs into professional practice other than the practitioner's own time, and

Z_{3t} is a vector of controllable practitioner characteristics which influence productivity.

Marginal productivities of the first and second factors are assumed to be positive.[1] As in the case of the effects of Z_{2t} on demand, Z_{3t} can be defined such that its effects of productivity are also positive. Finally, also as in the case of the demand function, the effects of Z_{1t} (uncontrollable practitioner characteristics) may be (a) ambiguous and (b) variable over time.

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[1] Reinhardt distinguishes between two distinct classes of own-time inputs into medical practice, medical and administrative. Although this distinction is important for some purposes, e.g., for explaining the failure of physicians to maximize net income conditional on their total time input or to underutilize purchased inputs into practice (due in both cases to the greater disutility of time devoted to administration and to complementarity between purchased inputs and administrative time), the distinction does not alter the general conclusions reached here concerning the determinants of hours and earnings over the lifecycle.

Practitioner characteristics Z_{1t} and Z_{2t} enter the demand function because they affect the quality of services rendered, at least as perceived by consumers. In the production function Z_{1t} and Z_{3t} reflect the effects of uncontrollable and controllable practitioner characteristics on the productivity of inputs (own time and purchased) into professional practice. Of course, certain variables entering into the demand-influencing vector Z_{2t} may also appear in the productivity-influencing vector Z_{3t}.

While a number of characteristics might be hypothesized to enter into the controllable-characteristic vectors Z_{2t} and Z_{3t}, an obvious candidate for both is the time and effort devoted by the professional to the maintenance of his human capital (skills and capabilities). In the absence of continuing investment, his professional knowledge will become obsolete, with possible consequences for both his productivity and the perceived quality of his services. Only by engaging in a continuing monitoring of new developments can obsolescence be avoided.

For simplicity, assume that $Z_{2t} = Z_{3t} = Z_{*t}$ and that Z_{*t} is a function solely of time devoted to obsolescence-offsetting human capital formation, i.e,

$$Z_{*t} = \int_{t_0}^{t} M(H_m) e^{-\delta(t - \tau)} d\tau, \qquad \text{(I.A.1.3)}$$

where H_m is the time devoted to maintenance of skills and capabilities,

M is the production function for these skills and capabilities, and

δ is the rate of obsolescence or depreciation of skills and capabilities.

In this formulation skills and capabilities undergo exponential decay. Thus, time devoted further in the past has a lesser impact on current demand or productivity than time devoted more recently. On the other hand, time invested earlier generates a flow of returns over a longer period.

In addition to explicit acquisition of new knowledge, a practitioner's capabilities may improve through learning-by-doing. Thus, one might hypothesize that Z_{2t} and/or Z_{3t} would include the effect of cumulative time devoted to professional practice, e.g.,

$$\text{(I.A.1.4)} \qquad Z_{**t} = \int_{t_0}^{t} G(H_{p\tau})\, e^{-\delta(t-\tau)} d\tau,$$

where δ is the rate of obsolescence of competencies acquired incidental to actual professional practice, and

G is the learning function relating competency to time devoted to practice.

Finally, lifetime preferences or utility can be represented as

$$\text{(I.A.1.5)} \qquad U_t = \int_{t}^{t_n} S_{t\tau}\, V_\tau e^{-\rho(\tau - t)} d\tau,$$

where U_t is the present value of expected future lifetime utility,

$S_{t\tau}$ is the probability of survival from t to τ,

V_τ is expected "instantaneous" utility at time τ (defined below), and

ρ is the practitioner's subjective discount rate.

Instantaneous utility, V_t, is a function of the practitioner's consumption of goods and services and of time devoted to various types of work:

$$\text{(I.A.1.6)} \quad V_t = V(C_t, H_{pt}, H_{mt}),$$

where C_t is consumption of purchased goods and services.

Because the instantaneous utility function may change over time, e.g., with age or stage of the lifecycle, it may be more appropriate to replace V(...) by $V_t(\ldots)$, or to include a vector of utility-function-shifting variables, Z_{4t}, as arguments of the instantaneous utility function, i.e.,

$$V_t = V(C_t, H_{pt}, H_{mt}; Z_{4t}) \tag{I.A.1.6a}$$

Given initial wealth, W_{t_0}, and anticipated prices of other practice inputs in all future periods, R_τ, the problem confronting the professional practitioner is to select those lifetime paths of hours devoted directly or indirectly to work ($H_{p\tau}$ and $H_{m\tau}$) and of utilization of other practice inputs (K_τ) which maximize the present value of expected lifetime utility (U_t, equation I.A.1.5), subject to the constraints that

$$H_{p\tau} + H_{m\tau} < \bar{H} \text{ for all } \tau > t, \text{ and} \tag{I.A.1.7}$$

$$\int_t^{t_n} (C_\tau + R_\tau K_\tau - Q_\tau P_\tau)e^{-r(t-\tau)}d\tau \tag{I.A.1.8}$$

$$\leq W_{t_0}\, e^{rt} + \int_{t_0}^{t} (Q_\tau P_\tau - R_\tau K_\tau - C_\tau)e^{r(t-\tau)}d\tau$$

where $\bar{H}$ is the total number of hours available at any time for work and leisure, and

r is the interest rate at which the practitioner can borrow and lend.

The first of these constraints simply requires that direct and indirect work activities not exceed the total number of hours available at any time. The

second stipulates that the present value of all future excesses of gross outlays over practice receipts cannot exceed the present value of (a) initial wealth plus (b) prior excesses of practice receipts over gross outlays, where gross outlays include both consumption outlays and practice costs.

This model can be further generalized to incorporate a schooling period, over the course of which (a) practice receipts and costs are assumed to be zero, (b) time is devoted only to schooling and leisure (with the former entering the utility function uniquely), and (c) schooling is provided at specified prices. If maximum lifetime utility at the initiation of the schooling period is U^P in professional practice P (or in a particular professional specialty) and U^A in the best alternative occupation (or specialty), then the present value of the net gain to entry into practice P is that increase in initial wealth which would just equate lifetime utility in the best alternative with lifetime utility in practice P.

The solution of an optional control problem of this scope and generality would be quite complex. However, the formal theoretic development of the model provides insight into the specification of simplified models amenable to solution and to estimation with available data.

A.2 SIMPLIFIED GROSS AND NET EARNINGS FUNCTION MODELS

In the absence of unambiguous measures of prices and outputs, the most obvious simplification of the foregoing model utilizes a gross earnings function. The gross earnings function can be viewed as the product of equations I.A.1.1 and I.A.1.2, i.e.,

$$\text{(I.A.2.1)} \quad Y_G = PQ = P(Q;\ X,\ Z_1,\ Z_2) \quad Q(H_p,\ K;\ Z_1,\ Z_3)$$

$$= Y_G(H_p,\ K;\ X,\ Z_1,\ Z_2,\ Z_3)$$

where Y_G is gross practice earnings.

Derivation of the reduced-form gross earnings function requires the specification of functional forms for the demand and production functions. Because the productivity of time devoted to medical practice may be a complex function of the size of the practice or of inputs other than own time, the standard Cobb-Douglas and CES production functions can be argued to be excessively restrictive (Reinhardt, 1975). One form of the production function which appears to be sufficiently general for present purposes is

$$\text{(I.A.2.2)} \quad Q = H_p^{\alpha_1} K^{\alpha_2} \; e^{\beta_0 + \beta_1 H_p + \beta_2 K + \beta_3 Z_1 + \beta_4 Z_2 + \beta_5 Z_3}$$

The marginal products of the two factors are, then,

$$\frac{\partial Q}{\partial H_p} = \left(\frac{\alpha_1}{H_p} + \beta_1\right) Q$$

$$\frac{\partial Q}{\partial K} = \left(\frac{\alpha_2}{K} + \beta_2\right) Q$$

Conjoining this production function with a constant elasticity of demand function, i.e.,

$$\text{(I.A.2.3)} \quad P = Q^{-b_1} e^{b_0 + b_2 X + b_3 Z_1 + b_4 Z_2}$$

the following reduced-form gross earnings function is obtained:

$$\text{(I.A.2.4)} \quad Y_G = PQ = H_p \; K^{c_2} \; \exp(c_0 + c_3 H_p + c_4 K + c_5 Z_1 + c_6 Z_2 + c_7 Z_3 + c_8 X)$$

where the reduced-form coefficients c_i can be expressed in terms of the parameters of the underlying structural equations.

The natural logarithm of gross earnings ($\ln Y_G$) is, then, a linear function of the variables (and/or of natural logarithms of the variables)

entering the production and demand functions. In the absence of data which would permit the simultaneous estimation of the demand and production functions, it will be impossible to identify the underlying structural parameters of these functions. Also because several of the "independent" variables in the reduced-form gross earnings equation are in fact endogenous in the larger model, the estimated parameters will be subject to simultaneous equations bias. However, this is also unavoidable given the unavailability of data which would permit indentification of other equations in the model, most notably the utility function.

With estimates of the parameters of the gross earnings function, the assumption of utility maximization and of a particular functional form for the utility function permit the derivation of (non-unique) utility function parameters consistent with (but not uniquely implied by) observed behavior. For present purposes, the utility function is assumed to exhibit constancy of the marginal utility of income, implying that utilities (disutilities) are additive. Thus, utility can be expressed as

$$\text{(I.A.2.5)}\quad V = Y_N - V^*(H_p)$$

where $Y_N = Y_G - RK$ is net income.

Maximization of V with respect to H_p and K, subject to the gross earnings function and an hours constraint ($H_p \leq H$) and assuming an interior solution ($H_p < H$), gives the following first-order conditions:

$$\text{(I.A.2.6a)}\quad \frac{\partial V}{\partial H_p} = \frac{\partial Y_N}{\partial H_p} - \frac{\partial V^*}{\partial H_p}$$

$$= \left(\frac{c_1}{H_p} + c_3\right)Y_G - \frac{V^*}{H_p} = 0$$

(I.A.2.6b) $\frac{\partial V}{\partial K} = (\frac{c_2}{K} + c_4)\, Y_G - R = 0$

Given observed (e.g., mean) values of H_p, K and Y_G, equations I.A.2.6a and I.A.2.6b can then be solved for, or at least will place constraints on, the parameters of the utility function.

The marginal wage rate in this model is

(I.A.2.7) $w_m = \frac{\partial Y_N}{\partial H_p} = (\frac{c_1}{H_p} + c_3)\, Y_G$

which will vary with variations in hours worked. As can be easily demonstrated, the marginal wage rate will be constant, equal to the average wage rate, if and only if the gross earnings function is Cobb-Douglas ($c_3 = c_4 = 0$) with constant returns to scale ($c_1 + c_2 = 1$), which would be implied only by a perfectly competitive market (price independent of quantity supplied) conjoined with a constant return to scale production function. For the reasons discussed in the previous chapter, these conditions are unlikely to be met in the case of independent professional practice. An elasticity of demand less than unity would imply less than constant returns to scale in the gross earnings function even if the production function itself were homogeneous of degree one. Fatigue and related effects will further imply a nonhomogeneous production function ($c_3 < 0$). Thus, a declining marginal wage rate would be anticipated.

Although abstracting from the complications introduced by competency enhancing activities and by learning-by-doing,[2] this simplified gross earnings

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[2] If current levels of competancy-enhancing activity are assumed to influence demand and/or productivity only in the future, then ignoring it will have no influence on the solution if this activity is so distinct from conventional practice activity that it enters the utility function additively, i.e., if

$$V = Y_N - V^*(H_p) - V^{**}(H_m)$$

function model is still quite complex. However, as developed above, this model fails to consider a potentially significant source of variation in the hours-earnings relationship, specifically, the effects of age or experience on the marginal physicial or revenue product of time devoted to practice.

Incorporation of experience effects would greatly complicate the gross earnings function model. These elaborations can be incorporated, however, if an otherwise simpler net earnings function is employed, abstracting from inputs other than the practitioner's own time (i.e., from inputs K). In this case a reasonably rich set of hours-experience interactions can be represented.[3]

Consider a net earnings function for individual a in occupation (or specialty) i of the form

$$\text{(I.A.2.8)}\quad Y_{Nia} = H_{ia}^{(\alpha_{0i} + \alpha_{1i}E_{ia} + \alpha_{2i}E_{ia}^{2})} e^{\beta_{0i} + \beta_{1i}A_{0ia} + \beta_{2i}X_{ia}}$$

Past levels of competency-enhancing activity and learning-by-doing in the course of past practice activity, however, will enter into the demand and production functions through the variables Z_2 and Z_3. If the solution of the optimal control problem discussed earlier revealed, under reasonable assumptions, that the optimal allocation of time in this activity is systematically related to experience (years of practice), then its current level would serve at least partially to identify its entire past history. Specifically, it is probably the case that the optimal path of H_m with experience is a function of (a) the depreciation rate, (b) the market interest rate, (c) the subjective discount rate, and (d) the change in the instantaneous utility function (specifically, the marginal disutility of labor) with age. Assumptions concerning each of these factors would then permit the current level of H_m to determine, first, its entire past path and, second, the depreciated current stock of such capabilities. However, in the absence of an explicit solution to the optimal control problem, it is impossible to specify concretely the manner in which this dimension of the problem should be incorporated. Thus, for immediate purposes this activity and its consequences for earnings and utility are ignored.

[3] Direct estimation of a net earnings function is also necessary if returns to physician training are to be determined. Primary sources of data on earnings of non-physicians permit only the estimation of net earnings functions. Thus, comparability between the earnings function estimates for physicians and non-physicians requires recourse to the simplified

where E_{ia} is years of labor-force experience (active practice),

A_{0ia} is age at labor-force entry (entry into active practice), and

X_{ia} is a vector of other variables influencing net earnings.

In this formulation[4] experience serves not to shift the earnings function in a logarithmically parallel manner (as in the conventional earnings function in which E and E^2 are subsumed in the vector X), although this effect of experience can also be permitted here, but rather to alter the elasticity of earnings with respect to hours

$$\text{(I.A.2.9)} \quad \eta_{Y,H} = \alpha_{0i} + \alpha_{1i}E_i + \alpha_{2i}E_i^2,$$

and hence the marginal wage rate,

$$\text{(I.A.2.10)} \quad w_{mi} = \frac{\partial Y_{Ni}}{\partial H_i} = (\alpha_{0i} + \alpha_{1i}E_i + \alpha_{2i}E_i^2) \frac{Y_{Ni}}{H_i}$$

Given observed hours of work, on the assumption of utility maximization the slope of the earnings function (the marginal wage rate) is equal to the marginal rate of substitution (the slope of the indifference curve) between hours and earnings at that point. Retaining the assumption of an additive utility function, the marginal rate of substitution is independent of the level of earnings, i.e., the indifference curves are vertically parallel. Although the convexity of the indifference curves (the rate at which the

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formulation.

[4] As discussed below, this is a simplification of the more complex hours-experience interactions permitted in the empirical analysis. However, this simplification facilitates the present discussion without abstracting from the central issue.

marginal rate of substitution increases) is not known, assuming the degree of convexity permits specification of the entire preference surface.

On the basis of the convexity-conditional preference function for individual a in occupation/speciality i and the estimated earnings functions for alternative occupations/specialities j , optimal hours and earnings in each alternative occupation/specialty can be determined. Also conditional on the assumed degree of convexity of the indifference curves, the income equivalents of the differentials in optimal hours of work across alternative occupations/specialities can be determined. Thus, an hours-adjusted earnings differential between i and j for individual a can be derived, equal to observed earnings in i less (a) optimal earnings in j and (b) the income equivalent of the excess of hours in i optimal hours in j.

If a is now redefined as age for a given individual, then discounting the hours-adjusted earnings differentials between occupations/specialties i and j to the point of entry into practice provides an estimate of the present value of the earnings gain to the incumbent in i of the choice of i over j. Of course, because this estimate of differential lifetime earnings is conditional on the assumed degree of convexity of the i-incumbent's indifference curves in the hours-earnings space, it may in fact be sensitive to the convexity assumption. More importantly, even if the degree of convexity could be uniquely determined, the estimate of returns to i over j based on the utility function of the i incumbent will differ from the estimate based on the utility function of the j incumbent if their revealed utility functions differ significantly.

The convexity-conditional estimate of the present value over the lifetime of differential hours-adjusted earnings, as a measure of the returns to occupational choice, can then be compared to the more conventional measures available in the literature. Specifically, the following comparison measures can be computed:

(1) the present value of earnings differences unadjusted for differences in hours (employing observed earnings in alternative occupations);

(2) the present value of earnings differences after adjusting earnings in the alternative occupation/specialty to correspond to observed hours in the "own" occupation/specialty (a Paasche index), recognizing the non-linearity of the hours-earnings relationship in the alternative occupation;

(3) the present value of earnings differences after adjusting earnings in the "own" occupation/specialty to correspond to observed hours in the alternative occupation/specialty (a Lespeyre index), recognizing the nonlinearity of the hours-earnings relationship in the "own" occupation;

(4) and (5) Paasche and Lespeyre estimates corresponding to (2) and (3), but imposing the conventional assumption that the earnings functions are linear in hours (proportionately adjusting observed earnings for differences in hours).

Operationally, mean observed values of all relevant variables in all alternative occupations/specialties will be employed below in the estimation of returns to occupational choice. Denote mean age of entry into

occupation/specialty i as $\bar{A}_{0i}$ and mean hours in i at age a as $\bar{H}_{ia}$. Given the mean age at entry, $\bar{A}_{0i}$, mean experience at age a is

$$\text{(I.A.2.11)} \qquad \bar{E}_{ia} = a - \bar{A}_{0i}$$

Given this information and the mean value of X_{ia}, earnings at age a of a person with mean characteristics in occupation/specialty i, denoted Y_{Nia}, can be computed from equation I.A.2.8. Assuming a utility function of the form

$$\text{(I.A.2.12)} \qquad V = Y_N - \gamma_0 H^{\gamma_1}, \quad \gamma_1 > 1$$

utility maximization implies that

$$\frac{\partial V}{\partial H} = \frac{\partial Y_N}{\partial H} - \gamma_1 \gamma_0 H^{\gamma_1 - 1} = (\alpha_0 + \alpha_1 E + \alpha_2 E^2) \frac{Y_N}{H} - \gamma_1 \gamma_0 H^{\gamma_1 - 1} = 0.$$

This equation, for a particular specialty and age, can be solved for γ_{0ia}, given an assumed value of γ_{1ia}, i.e.,

$$\text{(I.A.2.13)} \qquad \gamma_{0ia} = (\alpha_{0i} + \alpha_{1i} \bar{E}_{ia} + \alpha_{2i} E_{ia}) \bar{H}^{\gamma_{1ia}} Y_{Nia}/\gamma_{1ia}.$$

Increases in the assumed value of γ_{1ia} will then imply increased convexity of indifference curves in the hours-earnings space.

The implications of varying γ_0 and γ_1 subject to equation I.A.2.13 are indicated graphically in Figure I.A.1. Net earnings, Y_N, are represented in the upper quadrant as a function of hours of work. The implied marginal wage function, $w_m = \partial Y_N/\partial H$, is portrayed in the lower panel.

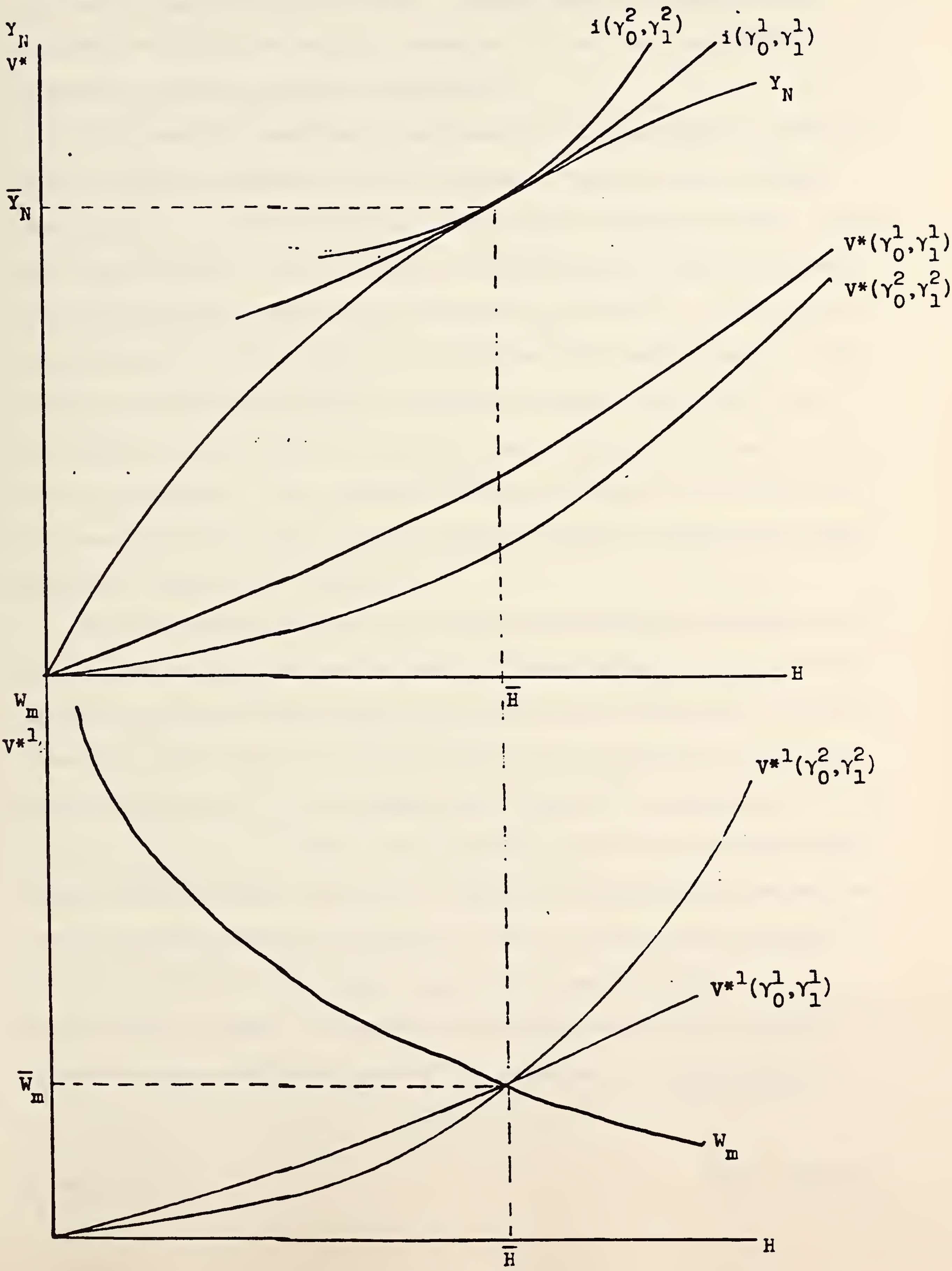
Because the marginal utility of income is stipulated to be constant and equal (arbitrarily) to unity, the total disutility of labor, $V^* = \gamma_0 H^{\gamma_1}$, and the marginal disutility of labor, $\partial V^*/\partial H = \gamma_1 \gamma_0 H^{\gamma_1 - 1}$, can be interpreted in income-equivalent (monetary) units. The total and marginal disutility of labor functions are thus presented in the upper and lower quadrants, respectively. Two alternative sets of disutility functions are indicated, corresponding to the parameter values (γ_0^1, γ_1^1) and (γ_0^2, γ_1^2), where $\gamma_1^1 < \gamma_1^2$ and $\gamma_0^1 > \gamma_0^2$.

The utility maximizing number of hours of work, H, is determined by the intersection of the marginal wage function and the marginal disutility of labor function in the lower quadrant, or equivalently, at the point in the upper quadrant at which the slopes of the net earnings and total disutility of labor functions are equal.

Indifference curves implied by these disutility of labor functions are also portrayed in the upper quadrant. The slope of the indifference curve (the marginal rate of substitution between earnings and work) is simply equal to the ratio of the marginal disutility of work to the (constant, unitary) marginal utility of income, equal under present assumptions to the marginal disutility of work. Thus, increases in γ_1 (compensated by reductions in γ_0) give rise to progressively more convex indifference curves, each of which is tangent to the net earnings function at $\bar{H}$ hours of work.

An important issue which arises in this context concerns the nature of changes in the utility function with age. At each age, a spectrum of mutually consistent pairs of values of γ_0 and γ_1 can be determined. However, for purposes of estimating present values of lifetime earnings in alternative occupations/specialties, it is necessary to discount actual or hypothetical

Figure I.A.1: Utility Function Parameters Determining Hours and Earnings


Y_N
V^*
$i(\gamma_0^2,\gamma_1^2)$
$i(\gamma_0^1,\gamma_1^1)$
Y_N
$\overline{Y}_N$
$V^*(\gamma_0^1,\gamma_1^1)$
$V^*(\gamma_0^2,\gamma_1^2)$
H
$\overline{H}$
W_m
V^{*1}
$V^{*1}(\gamma_0^2,\gamma_1^2)$
$V^{*1}(\gamma_0^1,\gamma_1^1)$
$\overline{W}_m$
W_m
H
$\overline{H}$

earnings over all ages. Thus, pairs of utility function parameters γ_{0ia}, γ_{1ia} must be specified for each age. Clearly, since a single pair of parameter values is not uniquely determined for any age, age profiles of parameter values are similarly indeterminate.

Two alternative approaches to determination of consistent age profiles of utility function parameters can be suggested, based on very different conceptions of the effect of aging on the marginal disutility of work. Under the first alternative age is viewed as increasing the disutility of work equiproportionately, regardless of the number of hours, i.e., the disutility of work function shifts upward in a logarithmically parallel manner. With respect to the utility function specified in equation I.A.2.12, this is equivalent to permitting γ_0 to vary with age, holding γ_1 (in equation I.A.2.13) constant. Here, presumably, γ_0 would be found to rise with age, at least beyond some point, and all levels of work would thenceforth become equiproportionately more onerous.

An alternative characterization of the relationship of the disutility of work to age assumes that age has only a "fatigue effect," i.e., that the disutility function rotates upward, with the relative age-induced increase in disutility rising more than proportionately with increases in hours. One characterization of this relationship would "anchor" the disutility function (e.g., at one hour of work), with increases in age serving to rotate the function upward around this point. Imposing this characterization on the utility function embodied in equation I.A.2.12, γ_0 (the total disutility of one hour of work, since $\gamma_0 H^{\gamma_1} = \gamma_0$ if $H = 1$) would be held constant over all ages, and numerical techniques would then be employed to determine an age profile of values of γ_1 consistent with this stationary

value of γ_0 and with the γ_0, γ_1 relationship given in equation I.A.2.13. Presumably, beyond some point γ_1 would then be found to rise with age.

If the earnings function were invariant with respect to age, either of these characterizations of the effects of aging on the disutility of work would be sufficient to induce a reduction in hours of work with advancing age. However, the earnings function clearly will vary with age, if only because experience and age will be perfectly correlated (assuming no periods of labor force nonparticipation other than schooling and identical age-schooling relationships across individuals).[5] Furthermore, experience may have complex consequences for the earnings function, altering either the marginal productivity of time and/or the entire function, and in either case the effect need not be monotonic. Thus, observed hours may either rise or fall with age. Nonetheless, the plausibility of the model will depend upon the finding of monotonic increases with age of either (a) γ_0, holding γ_1 constant (the first, equiproportionate, characterization of the effect of aging on the disutility of work), or (b) γ_1, holding γ_0 constant (the second, fatigue, characterization of the aging effect).

Having determined a spectrum of lifecycle paths of alternative consistent pairs of values γ_{0ia}, γ_{1ia}, the hours and earnings which an "average" persons of age a in occupation/specialty i would choose were he instead in occupation/specialty j can be determined by maximizing utility subject to the constraints of the earnings function estimated for occupation/specialty j. Denoting the resultant solutions by T_{Njia} and

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[5] The second of these restrictive assumptions will be relaxed in the empirical analysis of returns to medical specialization by inclusion in the earnings function of age at medical school graduation.

$\bar{H}_{jia}$, the income effect of the change in hours from $\bar{H}_{ia}$ to $\bar{H}_{jia}$, can be determined. Let $\bar{V}_{ia}$ be defined as

$$(\text{I.A.2.14}) \quad \bar{V}_{ia} = \bar{Y}_{Nia} - \gamma_{0ia}H^{\gamma_{1ia}}$$

Then

$$(\text{I.A.2.15}) \qquad \bar{Y}^{C}_{Nia}(\bar{H}_{jia}) = \bar{V}_{ia} + \gamma_{0ia}\bar{H}^{\gamma_{1ia}},$$

where the superscript C denotes a compensated level of income, is the level of income at which an age a incumbent in i would just be compensated for a change in hours from the actual $\bar{H}_{ia}$ to the hypothetical $\bar{H}_{jia}$ which he would choose to work if he faced the j earnings function. The difference

$$(\text{I.A.2.16}) \quad \bar{Y}^{C}_{Nia}(H^{-}_{jia}) - \bar{Y}_{Njia}$$

represents the hours-compensated income differential between i and j for occupation/specialty i incumbents at age a.

It should be noted that the alternative of determining the compensated level of income in occupation/specialty j consistent with observed hours in i , i.e.,

$$(\text{I.A.2.17}) \quad \bar{Y}_{Njia}(\bar{H}_{ia}) = \bar{V}_{jia} + \gamma_{0ia}\bar{H}^{\gamma_{1ia}}$$

where

$$(\text{I.A.2.18}) \quad \bar{V}_{jia} = \bar{Y}_{Njia} - \gamma_{0ia}\bar{H}^{\gamma_{1ia}},$$

compared to actual earnings in i would lead to an identical estimate of the hours-compensated income differential between occupations/specialties i and j as viewed from the vantage point of incumbents in i ', i.e.,

$$(\text{I.A.2.19}) \quad \bar{Y}^{C}_{Nia}(\bar{H}_{jia} \qquad - \bar{Y}_{Njia}$$

$$= \bar{Y}_{Nia} - \bar{Y}^{C}_{Njia}(\bar{H}_{ia})$$

This is implied by the assumed constancy of the marginal utility of income, subject to which the indifference curves are vertically parallel in the hours-earnings space.

Appendix B

THE INFLUENCE OF RISK ON OCCUPATIONAL CHOICE

B.1 THE ISSUE OF OCCUPATIONAL RISK

It has been frequently observed (e.g., Becker 1964) that the risks associated with human capital investments are generally higher than the risks of alternative classes of investment and that these risks tend to rise with the level of the investment, e.g., that the risks of graduate or professional training are greater than those of high school training. However, no serious attempt has been made to take these differential risks into account in the estimation of the returns to human capital investments.[6] The reason for this relative lack of serious attention is probably best explained by the complexity of the problem, both conceptually and empirically.

Conceptually, there are two basic issues, one subjective and one objective. The subjective issue concerns individual attitudes toward risk, while the objective issue concerns the variance in the expected value of lifetime earnings. Consider first the objective issue.

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[6] The only systematic attempt to take into account the effect of risk on returns to occupational choice is provided by Weiss (1972). However, as Hause (1974) has pointed out, Weiss's analysis is fatally flawed by its focus on annual earnings variability rather than on the variability of lifetime earnings. Specifically, Weiss determines the utility of earnings at each year of age, given (a) the mean and variance of earnings at that age and (b) a stipulated degree of risk aversion. This has the effect of greatly understating the returns to the choice of occupations characterized by high year-to-year income variations relative to occupations not so characterized, e.g., to occupations dominated by the selfemployed relative to those dominated by salaried employment.

Assume that earnings y in any year (or at any age) are drawn from a distribution (not necessarily normal) with mean μ and variance σ^2. The draw in each year is independent of the draw in any previous or subsequent year. For the moment, assume also that the individual's subjective discount rate is zero, i.e., that the present value of lifetime earnings is simply equal to the undiscounted sum of earnings in each year.

In this situation the mean of earnings over the lifetime, $\bar{y}$, according to the Central Limit Theorem, is distributed with mean μ and variance σ^2/n, where n is the length of the working lifetime. Clearly, as n increases σ^2/n assympotically approaches zero. Expected lifetime income, however, is $n\bar{y}$, which can be demonstrated to be distributed with mean $n\mu$ and variance $n\sigma^2$ (i.e., if x is distributed with mean and variance σ^2, then, for any constant a, ax is distributed with mean $a\mu$ and variance $a^2\sigma^2$). In short, even if earnings in each year are independently determined subject to the same distribution, the variance of lifetime earnings will be a linear function of the working lifetime, as will the expected value of lifetime earnings. This is the sense in which risk is attached to occupational choice.

The preceeding is, in fact, a rather special case, simply because earnings in any year have been assumed to be determined independently of earnings in any other year. An alternative, limiting case serves to indicate the possibly even greater magnitude of the risk confronting an individual making an occupational decision. Consider a situation in which earnings in the first year of the working lifetime, y_1, are drawn, as before, from a distribution with mean μ and variance σ^2. However, in this case there is only one draw: Earnings in all subsequent years $2,\ldots,n$ are stipulated to

equal earnings in the first year. Expected lifetime earnings are still $n\mu$, but the variance becomes $n^2\sigma^2$, n times greater than when earnings were independently determined in each year. This situation is one in which, ex ante, the individual is unable to determine his future position in the earnings distribution, but in which, once determined (at the outset of his career), his position in that distribution is invariant over time.

In both of these cases the variance of expected lifetime earnings ($n\sigma^2$ and $n^2\sigma^2$, respectively) is greater than the variance of earnings in any year (σ^2). In relative terms, however, the degree of risk associated with lifetime earnings is significantly smaller in the first case (independent annual draws) than in the second. Thus, the coefficient of variation (ratio of the standard deviation to the mean) is $(\sigma/\mu)/n^{\frac{1}{2}}$ if earnings are independently drawn each year, but is σ/μ for annual earnings and for lifetime earnings with a single, initial draw. Thus, the relative dispersion of lifetime earnings declines continuously with increases in the working lifetime if earnings in all years are determined independently.

Finally, a second limiting case should be mentioned. As in the case of a single draw, this limiting case dispenses with the assumption of independence in the determination of earnings in each year. But, rather than stipulating that the position in the distribution is invariant over time, this case stipulates that any positive deviation of earnings in one year is necessarily offset by a negative deviation in some other year. In this event, the variance in lifetime earnings is definitionally zero, regardless of the variance in annual earnings. If this were the case, risk would disappear.

B.2 INCORPORATING RISK IN ESTIMATES OF LIFETIME EARNINGS

The foregoing independent and limiting cases provide a useful introduction to the problem of variance in lifetime earnings. The simplicity of this analysis rests upon the assumption that (a) earnings in each year are drawn from a single distribution with given mean and variance and (b) lifetime earnings are simply the undiscounted sum of annual earnings, assumptions which obviously cannot be made in the empirical analysis which follows. All three of these cases, however, can be derived more generally. Consider the random variables y_i distributed with means μ_i and variances σ_i^2. Any weighted sum of these variables $\Sigma w_i y_i$ will be distributed with mean μ_s,

$$(\text{I.B.2.1}) \quad \mu_s = \sum_i w_i \mu_i ,$$

and variance σ_s^2,

$$(\text{I.B.2.2}) \quad \sigma_s^2 = \sum_i w_i^2 \sigma_i^2 + \sum_i \sum_{j \neq i} w_i w_j \sigma_{ij},$$

where σ_{ij} is the covariance between y_i and y_j.

In the foregoing, in which a discount rate of zero was effectively assumed, all w_i's were by definition unity. In the more general case, w_i will be defined as $(1 + \rho)^{-i}$, where ρ is the income rate of interest, as previously discussed. The assumption of a single distribution of annual income simply stipulates that $\mu_i = \mu$ and $\sigma_i = \sigma$ for all i.

The special case of independence further stipulates that the covariances in equation (I.B.2.2) are definitionaly zero, implying that the variance of lifetime earnings is simply $n\sigma^2$. The limiting case of a single draw implies that the covariances $\sigma_{ij} = \sigma^2$ for all i and j, with the result

that the variance of lifetime earnings is $n^2\sigma^2$ [$= n\sigma^2 + n(n - 1)\sigma^2$]. Finally, the case of systematically cancelling deviations over time is one in which the covariances are negative, i.e.

$$\sigma_s^2 = 0 = n\ ^2 + n(n-1)\bar{\sigma}_{ij}$$

where $\bar{\sigma}_{ij}$ is the mean of the covariances over all i and j ($i \neq j$), implying that

$$\bar{\sigma}_{ij} = - \frac{\sigma^2}{n-1}$$

Thus, the simplified special and limiting cases can be expressed in terms of a more general model.

As discussed further below, from the estimated earnings functions for each occupation it is possible to derive mean predicted earnings at each age a, $\hat{Y}_a$, which can be employed as an estimate of the mean of earnings at that age. Similarly, it.ill be possible to determine the variance of predicted earnings at that age, σ_a^2. Defining the weights w_i as $(1 + \rho)^{-(a - L)}$, where L is the lower bound of the working lifetime, all variables entering into equations I.B.2.1 and I.B.2.2 are known other than the covariance terms σ_{ij}. From cross-sectional data on earnings as a function of age, it is clearly impossible to determine these covariances. However, each of the previously discussed special-cum-limiting cases can be incorporated by assumption.

In all cases mean expected lifetime earnings (present value) will be given by

$$P = \sum_{a=L+1}^{U} (1+\rho)^{-(a-L)}\hat{Y}_a$$

where U is, as before, the upper bound on the working lifetime.

Assuming independence of earnings over time, the covariance terms (σ_{ij}) of equation I.B.2.2 are by definition zero, implying that the variance of the present value of lifetime earnings is

$$\sigma_p^2 = \sum_{a=L+1}^{U} (1+\rho)^{-2(a-L)}\sigma_a^2$$

In the limiting case of invariance over time in the position of an individual in the distribution of annual earnings, the covariance of earnings between any two periods is simply equal to the product of the standard deviations of earnings, i.e., $\sigma_{aa'} = \sigma_a\sigma_{a'}$ for all a and a', and the variance of the present value of lifetime earnings becomes

$${}^{2}_{p} = \sum_{a=L+1}^{U} (1+\rho)^{-2(a-L)}\sigma_a^2 + \sum_{a=L+1}^{U-1} \sum_{a'=a+1}^{U} (1+\rho)^{-(a+a')+2L}\sigma_a\sigma_{a'}$$

The third case, of cancelling deviations of actual from mean earnings over time, is somewhat more complicated. In the simplified single distribution situation, the maximum absolute value of the mean negative covariance consistent with the given annual variance was that value which reduced the variance in undiscounted lifetime earnings to zero. Clearly, this limitation will continue to apply, i.e., it is impossible that the mean covariance should be so negative as to imply a "negative" variance of undiscounted earnings. Thus, the limiting value of the mean covariance is that value for which

$$0 = \sum_{a=L+1}^{U} \sigma_a^2 + [(U-L)(U-L-1)]\bar{\sigma}_{aa'}$$

or

$$\bar{\sigma}_{aa'} = -\sum_{a=L+1}^{U} \sigma_a^2/[(U-L)(U-L-1)]$$

If this is the limiting value of the negative mean covariance, then the lower bound on the variance of discounted lifetime earnings is

$$\sigma_p^2 = \sum_{a=L+1}^{U} (1+\rho)^{-2(a-L)}\sigma_a^2 + \sum_{a=L+1}^{U-1} \sum_{a'=a+1}^{U} (1+\rho)^{-(a+a')+2L}\overline{\sigma}_{aa'}$$

which will be greater than zero. Substantively, the future positive (negative) deviations of actual from mean earnings will cancel previous negative (positive) deviations, but these future deviations will have a lower present value than the previous deviations, implying that the variance of discounted lifetime earnings will still be positive.

In summary, conditional on the assumption concerning the covariance of earnings over time, the mean and variance of the present value of expected lifetime earnings can be determined. Unfortunately, however, the precise distribution of this present value is not known, and for purposes discussed subsequently, the characteristics of this distribution are required. Fortunately, several of these characteristics can be inferred. Consider, first, the distribution of annual earnings. Because the earnings function expresses the natural logarithm of earnings as a function of other variables, e.g., experience, under the usual normality assumptions the distributin of predicted annual earnings will be log normal. Thus, the distributin of annual earnings will be bounded below by zero and will be positively skewed. By implication, the distribution of lifetime earnings will have qualitatively similar characteristics. Although the sum (or weighted sum) of log normal variables is not itself log normal,[7] this suggests that a log normal

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[7] Rather, the product of log normal variables is log normal.

approximation to the distribution of lifetime earnings may not be unreasonable.

Assume provisionally, then, that lifetime earnings are log normally distributed, i.e.

$$\ln P \sim N(\mu,\sigma^2)$$

Although the mean, $\bar{P}$, and variance, σ_P^2, of lifetime earnings are known, the mean, μ, and variance, σ^2, of the log of lifetime earnings must be derived. In the case of the log normal distribution it can be shown (Aitchison and Brown, 1957) that the coefficient of variation of P, η, can be expressed as a function of the variance σ^2 of ln P, i.e.

$$\eta^2 = e^{\sigma^2} - 1$$

The coefficient of variation, however, is equal to the ratio of the standard deviation of P to its mean, i.e,

$$\eta^2 = \frac{\sigma_P^2}{\bar{P}^2}$$

Thus,

$$\sigma_P^2/\bar{P}^2 = e^{\sigma^2} - 1$$

$$\text{(I.B.2.3)} \quad \sigma^2 = \ln\left(\frac{\sigma_P^2}{\bar{P}^2} + 1\right)$$

Given the variance of the distribution of ln(P), it is possible to derive the mean of ln(P) from the relationship between the mean of P and the mean and variance of ln(P), i.e.,

$$\text{(I.B.2.4)} \quad P = e^{\mu + .5\sigma^2}$$

and

$$\mu = \ln P - .5\sigma^2$$

Thus, subject to the assumption that the distribution of lifetime earnings is logarithmically normal, the characteristics of that distribution have been determined, conditional on the stipulated covariance of earnings over time.

It is now possible to turn from the objective question of the dispersion of expected lifetime earnings to the subjective question of the individual's preferences concerning more versus less risky alternatives. The point here is that a risk-averse individual might well prefer an occupation with lower expected lifetime earnings if the variance of these expected earnings were also sufficiently lower than that associated with alternative available occupations.

To take risk into account effectively requires that expected lifetime earnings be distinguished from the expected utility of lifetime earnings. It is assumed here that the individual's utility function (for purposes of evaluating risk) is characterized by what Arrow (1965) has referred to as constant relative risk aversion, implying a utility function of the form[8]

$$\text{(I.B.2.5)} \quad U(P) = \frac{P^{1-\alpha}}{1-\alpha}, \quad \alpha \neq 1,$$
$$= \ln(p), \quad \alpha = 1,$$

where α is the index of relative risk aversion.

In this formulation, $\alpha = 0$ indicates risk-neutrality ($\partial U/\partial P = 1$), $\alpha > 0$ indicates risk aversion ($\partial U/\partial P < 1$), and $\alpha < 0$ indicates risk preference ($\partial U/\partial P > 1$).

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[8] An interesting discussion of the properties and implications of this utility function is provided by Samuelson (1971).

On the assumption that P is distributed log normally, it follows

$$(\text{I.B.2.6}) \quad \bar{U} = E(U) = \frac{1}{1-\alpha} e^{(1 - \alpha)} + .5(1 - \alpha)^2\sigma^2, \ \alpha \neq 1,$$

$$= \mu \ , \ \alpha = 1.$$

Then, if individuals are risk averse, the appropriate measure of the returns to the choice of occupation i over occupation j is $\bar{U}_i - \bar{U}_j$, not the difference in expected lifetime earnings in occupation i and j , $\bar{P}_i - \bar{P}_j$. If the income rate of interest ρ refers to a riskless alternative, then the net utility capital value, $\bar{U}_i - \bar{U}_j$, captures the influences of the risks associated with both alternatives.

Thus, the net utility capital values of returns to the choice of one occupation over another can be determined for alternative assumed degrees of risk aversion (values of α), providing a spectrum of estimated utility capital values. Unlike the net capital values themselves, which are expressed in constant dollars, the unit of utility measurement has no intuitive meaning. However, in empirical analyses these can be expressed relative to the utility of expected lifetime earnings in the subject occupation, i.e., as $(\bar{U}_i - \bar{U}_j)/\bar{U}_i$, providing an indication of the relative departure from perfectly competive market equilibrium (for which $\bar{U}_i - \bar{U}_j$ would equal zero), conditional on the stipulated degree of relaive risk aversion.

Another approach the question of risk aversion and market equilibrium is to ask the following question: Given an observed difference in expected lifetime earnings between occupations i and j, how risk-averse (-seeking) would an individual have to be in order to be indifferent between the two

occupations? In other words, what degree of risk aversion would be required if the observed differential were to be consistent with market equilibrium?[9]

This question can be answered by setting $\bar{U}_i$ equal to $\bar{U}_j$ (each as a function of μ, σ^2 and α, as specified in equation I.B.2.6) and solving for α, with the result that

$$\text{(I.B.2.7)} \qquad \alpha = \frac{\mu_i - \mu_j}{.5(\sigma_i^2-\sigma_j^2} + 1$$

The plausibility of the resultant value of α would then provide an indication of the consistency of the observed lifetime earnings differential with the existence of competitive equilibrium.

Finally, iterating on the value of the income rate of interest, ρ, that value of ρ consistent with $\bar{U}_i = \bar{U}_j$ could be determined, conditonal on any stipulated degree of risk aversion α. This value would then be the risk-cognizant internal income rate of return to the selection of occupation i over occupation j.

Thus, each of the measures of returns to occupational choice which can be derived ignoring risk (the net capital value differential and the internal rate of return) has a direct parallel when the effects of risk aversion are recognized.

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[9] This is a variation on the type of question addressed by Crain and Zardkoohi (1980), who were concerned with the nonpecuniary benefits required in alternative occupations as a condition for equilibrium.

PART II

PHYSICIAN EARNINGS, 1976-77

During the last few decades, both technical and economic factors have contributed to a very rapid extension of specialization in medicine. The advance of medical science has made specialization both desirable and possible; the financial gains promised by specialization have furnished an economic incentive. A count of the 1931 Directory of the American Medical Association indicates that only 68 per cent of all physicians considered themselves general practitioners, the other 32 per cent being almost equally divided between partial and complete specialists. Sample studies indicate an even larger proportion of specialists. Moreover, specialization seems to be still increasing.

M. Friedman and S. Kuznets (1945, p. 8)

Chapter 1

SPECIALTY- SPECIFIC PHYSICIAN EARNINGS FUNCTIONS

1.1 PHYSICIAN PRACTICE HOURS AND EARNINGS

Physician labor, obviously, is not sold in precise time- defined units at a fixed, market- determined price. Rather, as in the case of most professional occupations, the practitioner confronts a demand for his professional services, the production of which requires inputs which include his own time and effort. As developed in greater detail above (Part I), characteristics either of demand or of the production function may imply a more- or- less- rapid decline in the return to an additional increment of the physician's own time, i.e., in his marginal wage rate. A monopolistically- competitive market, in which the demand confronting the individual practitioner (firm) is less than infinitely elastic, would have this consequence, as would a production function in which the practitioner's efficiency declines with increases in time devoted to work.

The relationship between earnings and work effort has critical implications for the estimation of the returns to professional training or specialization. As pointed out by Lindsay (1971), if human capital investments of the type represented by professional training and specialization serve to increase the wage rate,[1] then some part of the

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[1] Lindsay considers only the case of a constant (marginal- equal- to- average) wage rate. Recognition of the nonlinearity of the earnings function requires the qualification that only the average wage rate need be positively related to human capital intensity, while it is the marginal wage rate which will primarily determine the level of work effort (although

earnings gain associated with a human capital investment will be due to the increase in work effort induced by the higher wage rate. Even if an individual were indifferent between two occupations distinguished only by their associated levels of human capital investment, it might still appear that earnings in the more human- capital- intensive occupation were greater than required to generate a competitive return to the investment, simply because the practitioner must also be compensated for the greater work effort called forth by the higher wage. Thus, it is necessary to adjust observed interoccupational earnings differences for concomitant differences in hours of work in the derivation of estimates of returns to human capital investment.

When the possible relationships between characteristics of demand and of production functions, on the one hand, and human capital intensity, on the other, are recognized, however, it is no longer clear that, at the margin, the wage rate in a human- capital- intensive occupation will exceed the wage rate in a less human- capital- intensive occupation. Especially because the services of human- capital- intensive practitioners tend to be highly differentiated (nonhomogeneous), the elasticity of demand for an individual's services would be expected to decline with increases in human capital intensity. Thus, the marginal wage rate may decline more rapidly in more human capital intensive occupations than in others.

Even if the wage rate is invariant with hours of work, the adjustment of interoccupational earnings differentials for associated differences in hours of work is not unambiguous, unless the underlying utility function in the hours- earnings space is known.[2] However, nonlinearity in the earnings- hours

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income effects of inframarginal earnings will also have an influence on the supply of labor).

[2] This is essentially an index number problem, as discussed previously.

relationship requires that the entire functional relationship be known if an estimate of the returns to human capital investment is to be made. Point estimates of hours and earnings are no longer sufficient as a basis for derivation of returns to human capital.

In this analysis the nonlinearity in the hours earnings relationship is explicitly recognized in the estimation of specialty- specific physician earnings functions. On the basis of these estimated earnings functions, hours- of- work- adjusted estimates of the returns to physician specialization are derived in the following chapter.

1.2 THE ESTIMATED PROFESSIONAL- EARNINGS MODEL

The physician earnings functions estimated here represent variations on the general professional earnings model developed above. Specifically, demand and production functions confronting the individual practitioner are assumed to have the following forms:

(II.1.1) Demand function $P = P(Q, X_d)$

(II.1.2) Production function $Q = Q(H, X_p)$

where P is price per unit of service,

X_d is a vector of other demand- influencing variables,

Q is output,

X_p is a vector of production- influencing variables, and

H is hours of work.

For simplicity, inputs other than the physician's own time are ignored.

Assuming specific functional forms for both the demand and production functions, it is possible to derive the physician earnings function and to specify the relationship between the elasticities of demand and of output, on

the one hand, and the marginal wage rate and elasticity of earnings with respect to hours of work, on the other:

$$\text{(II.1.1a)} \quad P = Q^{a_1} e^{a_0 + a_2 X_d}$$

$$\text{(II.1.2a)} \quad Q = H^{b_1} e^{b_0 + b_2 H + b_3 X_p}$$

Physician earnings are then equal to the product of price and quantity:

$$\text{(II.1.3)} \quad Y = PQ = H^{b_1(1+a_1)} e^{[b_0(1+a_1)+a_0]+b_2(1+a_1)H+b_3(1+a_1)X_p+a_2X_d}$$

$$= H^{c_1} e^{c_0+c_2H+c_3X}$$

where $c_0 = b_0(1+a_1) + a_0$,

$c_1 = b_1(1+a_1)$,

$c_2 = b_2(1+a_1)$,

$c_3 = [b_3(1+a_1) + a_2]$, and

$X = [x_p \;\; x_d]$.

The following elasticities can then be derived:

(II.1.4a) Demand (Q) with respect to price (P) $\quad \eta_{Q,P} = -1/a_1, \quad a_1 \leq 0$

(II.1.4b) Output (Q) with respect to hours (H) $\quad \eta_{Q,H} = b_1 + b_2H$

(II.1.4c) Earnings (Y) with respect to hours (H) $\quad \eta_{Y,H} = b_1(1+a_1) + b_2(1+a_1)H$

$$= c_1 + c_2H$$

Finally, the marginal wage rate (w_m) is

$$\text{(II.1.5)} \quad w_m = [b_1(1+a_1)H^{-1} + b_2(1+a_1)]Y$$

$$= (c_1H^{-1} + c_2)Y$$

Thus, the marginal wage rate will be invariant with respect to hours of work if and only if (1) the elasticity of demand is infinite ($a_1 = 0$) and (2) the elasticity of output with respect to hours is unity ($b_1 = c_1 = 1$ and $b_2 = c_2 = 0$). Regardless of the elasticity of output with

respect to hours of work, the marginal wage rate will be zero if (or, over any range in which) the elasticity of demand is unity ($a_1 = -1$), setting a lower bound on the demand elasticity which can reasonably confront the individual practitioner.

Unless either the demand or production function can be estimated directly, estimation of the reduced- form earnings function will not permit identification of all of the underlying parameters. However, conditional on assumed values of certain critical parameters, e.g., the elasticity of output with respect to hours (for which several independent estimates are available), the implied values of other parameters can be derived. In a subsequent chapter this approach is utilized to indicate the consequences for the prices of physician services and for physician earnings of increases in competition, as reflected in increases in elasticities of demand confronting individual physicians, identifying critical increases in elasticities which would insure no decreases (and possibly increases) in physician work effort (and hence in the short- run supply of physician services, and this analysis is then generalized to permit identification of policies which would have neither short- nor long- term consequences for supply.

1.3 ESTIMATED SPECIALTY- SPECIFIC EARNINGS FUNCTIONS

The reduced- form professional earnings function developed above (equation II.1.3) has been estimated for each of the 18 physician specialties for which data are provided by the 1976 and 1977 HCFA Physician Practice Cost and Income Surveys (denoted PPCIS76-77). The HCFA surveys exclude physicians in graduate training (internships and residencies). For the 15 surveyed medical and surgical specialties the samples are also restricted to physicians (M.D.s and

osteopaths) in private, non-hospital-based practice. In the case of the anesthesiology, pathology and radiology the universe is extended to include hospital-based practitioners.

In order to restrict the analysis to physicians in active practice, observations with any of the following characteristics were excluded: (a) age greater than 75, (b) weekly medical practice hours less than 20, and/or (c) annual weeks of practice less than 40. Female physicians were also excluded in the estimations. For purposes of comparability of earnings between the two years (and also between the HCFA surveys and the 1967-78 Current Population surveys examined subsequently), earnings were deflated to constant 1972 dollars utilizing the implicit GNP deflator for personal consumption expenditure (PCE). With a value of approximately 200 in the spring of 1982, the PCE deflator was 132.8 in 1976 and 141.7 in 1977. Data for the two survey years were pooled in order to increase sample sizes and hence achieve statistically more stable and significant coefficient estimates.

The dependent variable in the estimated earnings function is the natural logarithm of annual (survey year) net professional earnings. Independent variables include:

(1) Experience [survey year (1976 or 1977) minus year of medical school graduation, in decades]
(2) Experience (in decades) squared
(3) Annual hours devoted to medical practice (in thousands)
(4) Natural logarithm of annual medical practice hours (in thousands)
(5) Age at medical school graduation (in decades)
(6) Incorporated practice (1=yes, 0=no)
(7) Solo practice (1=yes, 0=no)
(8) Practice at more than one hospital (1=yes, 0=no; hospital-based only)
(9) Department chief (1=yes, 0=no; hospital-based only)
(10) Dummy variable for 1977 (=0 in 1976, =1 in 1977)

In addition to the basic form of the earnings function, a richer version, including interactions between the logarithm of hours, on the one hand, and

experience and experience squared, on the other, is also estimated. In a preliminary analysis region and residence variables were also tested but found to be generally insignificant, possibly because of the relatively small sample sizes involved.

In an earnings function of this form it is anticipated that, at least initially, the effect of experience on earnings will be positive, reflecting the effects of "learning by doing," i.e., the accumulation of human capital through actual practice. After some point, however, it is expected that, because of obsolescence of human capital and of the effects of age on general efficiency in production, the effects of additional experience will be negative. Thus, experience is expected to have a positive sign and experience- squared a negative sign.

In general, it is anticipated that the elasticity of earnings with respect to annual hours of practice will be positive but will decline with increases in hours. Thus, the sign of the natural logarithm of hours is expected to be positive, while the sign of actual hours is expected to be negative. The possibility that net practice earnings would actually decline with increases in hours beyond some point cannot be ruled out, as efficiency may decline radically while required nonphysician inputs may increase significantly.

Age at medical school graduation (denoted "Bakke") may have ambiguous effects. On the one hand, the older graduate may have greater real or apparent maturity, positively valued by patients. On the other, more advanced age may reflect greater difficulty in achieving entry into medical school or in completing medical study, the causes of which might well be reflected in a lesser quality of care and a reduced capacity to attract patients. Thus, no

firm expectations concerning the sign of this variable can be stated _a priori_. Moreover, the signs may be different in different specialties.

The practice- type variables may reflect both real effects and effects of the form of practice on reporting biases. For organizationally more complex and highly structured practices, reporting error is likely to be significantly lower, and the general direction of bias in the reporting of earnings is likely to be negative; thus, the incorporated practice dummy variable would be expected to have a positive coefficient, while the sign of the solo practice variable would be expected to be negative. In general, real effects, e.g., of greater efficiency in utilization of both physician and nonphysician inputs, would also be expected to lead to this pattern of signs, especially with reference to solo practice.

For hospital- based physicians status as a department chief would be expected to be reflected in higher earnings. Practice in more than one hospital, however, might have varying effects. If multiple- hospital- practice reflected relatively low demands for specialist services, the effect might well be negative, while exploitation of a relative monopoly position in several different "markets" might lead to the finding of a positive sign on the coefficient of this variable.

A digression is in order concerning the definition of experience. In the absence of other information it is conventional to define experience in terms of age and years of schooling completed. Here a somewhat more direct measure is possible, since information is available not only on the level of schooling completed (a medical degree) but also on the age at which that degree was received. However, since the sample excludes persons in graduate medical training, a more appropriate measure would relate to practice experience

subsequent to the completion of graduate training (internship and residency). Unfortunately, information on the duration of the physician's training period is effectively unavailable. Thus, the measure of experience utilized in this analysis (a) includes the period of graduate medical training and (b) assumes that the physician has been actively engaged in either training or actual practice continuously since medical school graduation. Effectively, a year of graduate training and a year of post- training practice are assumed to have identical consequences for earnings. This assumption is obviously questionable, since it would provide no basis on which to rationalize the choice of any training at all, unless the earnings of a trainee were at least equal to the earnings of a comparable practitioner (which is distinctly not the case). The confusing effects of this blatently unsupportable assumption are reduced somewhat because the estimates will control for specialty, with the intraspecialty variance in training presumably substantially less than the variance in training across all specialties. Nonetheless, it is important to recognize that, even with the information available, the measure of experience is less than ideal.

The estimated earnings functions are presented in Tables II.1.1(1) through II.1.1(18), which also provide estimates of an annual practice hours equation, in which the dependent variable is the natural logarithm of annual hours (in thousands), expressed as a nonlinear function of age (including age, age- squared and age- cubed, with age expressed in decades).

Because the independent variables fall into several natural groupings, a convenient initial focus in the examination of these equations is on the statistical significance of these variable groups. Table II.1.2 provides F-test significance levels for (1) the more- and less- parsimonious earnings

TABLE II.1.1

Estimated Earnings and Hours Functions

(1) Allergy

```
                   (  1)          (  2)          (  3)
COMMAND/LINE    |OLSQ     / 14  |OLSQ     / 20  |OLSQ     / 25  |
SAMPLED ON      |OK       (  0) |OK       (  0) |CK       (  0) |
N/NUM CCNSTR    |     197/  0   |     197/  0   |     197/  0   |
EQN STD ERR     |  .4642        |  .4629        |  .3035        |
R-SQUARED       |  0.150        |  0.146        |  0.040        |
-------------------------------------------------------------------
DEP VARIABLE    |LNINC    (  0) |LNINC    (  0) |LNANHR   (  0) |
-------------------------------------------------------------------

D77       (  0) |  .9500E-01    |  .3870E-02    | -.1290E-01
   STD ERROR    |( .1398      ) |( .6704E-01)   |( .4411E-01)

DINCOR    (  0) |  .1851        |  .1900        |  .2677E-01
   STD ERROR    |( .7277E-01)   |( .7210E-01)   |( .4655E-01)

DSOLO     (  0) | -.5595E-01    | -.5625E-01    |  .5995E-01
   STD ERROR    |( .7957E-01)   |( .7935E-01)   |( .5113E-01)

E10       (  0) |  .3493        |  .3565
   STD ERROR    |( .1661      ) |( .1627      )

ESQR      (  0) | -.6435E-01    | -.7682E-01
   STD ERROR    |( .3243E-01)   |( .2932E-01)

BAKKE     (  0) | -.1277        | -.1210
   STD ERROR    |( .1213      ) |( .1207      )

ANNHRS    (  0) | -.1263        | -.7769E-01
   STD ERROR    |( .2C33      ) |( .1966      )

LNANHR    (  0) |  .5482        |  .3348
   STD ERROR    |( .5578      ) |( .4890      )

LNAHXE    (  0) |  .4619E-02
   STD ERROR    |( .6104E-02)

LNAHE2    (  0) | -.1798E-01
   STD ERROR    |( .1994E-01)

C         (  0) |  10.36        |  10.47        | -.6092E-01
   STD ERROR    |( .4322      ) |( .4061      ) |( 2.493      )

AGE10     (  0)                                 |  .6461
   STD ERROR                                    |( 1.459      )

AGE2      (  0)                                 | -.1394
   STD ERROR                                    |( .2774      )

AGE3      (  0)                                 |  .9055E-02
   STD ERROR                                    |( .1717E-01)
-------------------------------------------------------------------
```

Table II.1.1, continued
(2) Cardiology

```
                    (   1)           (   2)           (   3)
COMMAND/LINE   |OLSQ       / 14  |OLSQ      / 20  |OLSQ      / 25  |
SAMPLED ON     |OK         (   0)|OK         (   0)|OK        (   0)|
N/NUM CONSTR   |       162/    0 |       162/    0 |       162/    0 |
EQN STD ERR    |   .4789         |   .4805         |   .2623        |
R-SQUARED      |   0.249         |   0.234         |   0.131        |
--------------------------------------------------------------------
DEP VARIABLE   |LNINC      (   0)|LNINC     (   0)|LNANHR    (   0)|
--------------------------------------------------------------------

D77      (   0)| -.7039E-01      | -.2097E-01      | -.1019
  STD ERROR    |(  .1690        ) |(  .7872E-01)    |(  .4238E-01)

DINCOR   (   0)|  .1287          |  .1169          |  .1267
  STD ERROR    |(  .8656E-01)    |(  .8658E-01)    |(  .4620E-01)

DSOLO    (   0)| -.3652          | -.3692          |  .1595E-01
  STD ERROR    |(  .8248E-01)    |(  .8266E-01)    |(  .4508E-01)

E10      (   0)|  .3646          |  .4141
  STD ERROR    |(  .1679        ) |(  .1639       )

ESQR     (   0)| -.1152          | -.8523E-01
  STD ERROR    |(  .3563E-01)    |(  .3074E-01)

BAKKE    (   0)| -.3674E-01      | -.6575E-01
  STD ERROR    |(  .2146        ) |(  .2139       )

ANNHRS   (   0)|  .3057          |  .8602E-01
  STD ERROR    |(  .2391        ) |(  .1993       )

LNANHR   (   0)| -1.156          | -.1909
  STD ERROR    |(  .8091        ) |(  .5852       )

LNAHXE   (   0)| -.2154E-02
  STD ERROR    |(  .6594E-02)

LNAHE2   (   0)|  .3975E-01
  STD ERROR    |(  .2391E-01)

C        (   0)|  10.99          |  10.60          |  3.816
  STD ERROR    |(  .6827        ) |(  .6408       ) |(  1.895       )

AGE10    (   0)                                    | -1.714
  STD ERROR                                        |(  1.132       )

AGE2     (   0)                                    |  .3504
  STD ERROR                                        |(  .2196       )

AGE3     (   0)                                    | -.2345E-01
  STD ERROR                                        |(  .1382E-01)
--------------------------------------------------------------------
```

Table II.1.1, continued
(3) Dermatology

```
                      (   1)             (   2)             (   3)
COMMAND/LINE    |OLSQ        / 14 |OLSQ        / 20 |OLSQ        / 25 |
SAMPLED ON      |CK         (   0)|CK         (   0)|CK         (   0)|
N/NUM CONSTR    |        196/   0 |        196/   0 |        196/   0 |
EQN STD ERR     |  .3798          |  .3781          |  .2591          |
R-SQUARED       |  0.227          |  0.226          |  0.095          |
---------------------------------------------------------------------
DEP VARIABLE    |LNINC      (   0)|LNINC      (   0)|LNANHR     (   0)|
---------------------------------------------------------------------

D77       (   0)| -.1355          | -.1492          | -.2371E-01
   STD ERROR    |(  .1063        )|(  .5525E-01)    |(  .3743E-01)

DINCOR    (   0)|  .1644          |  .1619          | -.3298E-01
   STD ERROR    |(  .6065E-01)    |(  .5954E-01)    |(  .4091E-01)

DSOLO     (   0)| -.8694E-01      | -.8856E-01      |  .6372E-02
   STD ERROR    |(  .7685E-01)    |(  .7629E-01)    |(  .5225E-01)

E10       (   0)|  .2478          |  .2798
   STD ERROR    |(  .1240        )|(  .1121        )

ESQR      (   0)| -.7329E-01      | -.7133E-01
   STD ERROR    |(  .2292E-01)    |(  .2207E-01)

BAKKE     (   0)| -.2285          | -.2346
   STD ERROR    |(  .1000        )|(  .9912E-01)

ANNHRS    (   0)| -.8937E-01      | -.1185
   STD ERROR    |(  .2067        )|(  .2005        )

LNANHR    (   0)|  .2695          |  .4224
   STD ERROR    |(  .5307        )|(  .4677        )

LNAHXE    (   0)|  .9925E-03
   STD ERROR    |(  .6062E-02)

LNAHE2    (   0)|  .1044E-01
   STD ERROR    |(  .2018E-01)

C         (   0)|  11.17          |  11.12          |  5.395
   STD ERROR    |(  .3376        )|(  .3142        )|(  1.566        )

AGE10     (   0)                                    | -2.897
   STD ERROR                                        |(  .9638        )

AGE2      (   0)                                    |  .5965
   STD ERROR                                        |(  .1918        )

AGE3      (   0)                                    | -.4009E-01
   STD ERROR                                        |(  .1239E-01)
---------------------------------------------------------------------
```

Table II.1.1, continued
(4) Gastroenterology

```
                    (   1)            (   2)            (   3)
COMMAND/LINE   |OLSQ        / 14 |OLSQ        / 20 |OLSQ        / 25 |
SAMPLED ON     |OK          (  0)|OK          (  0)|OK          (  0)|
N/NUM CONSTR   |       134/    0 |       134/    0 |       134/    0 |
EQN STD ERR    |  .3381          |  .3400          |  .2398          |
R-SQUARED      |  0.254          |  0.233          |  0.182          |
----------------------------------------------------------------------
DEP VARIABLE   |LNINC     (    0)|LNINC     (    0)|LNANHR    (    0)|
----------------------------------------------------------------------

D77       (  0)| -.3608E-01      | -.3570E-01      | -.1193E-01
  STD ERROR    |(  .1358        )|(  .5944E-01)    |(  .4178E-01)

DINCOR    (  0)|  .5054E-01      |  .3870E-01      |  .8711E-01
  STD ERROR    |(  .6621E-01)    |(  .6539E-01)    |(  .4556E-01)

DSOLO     (  0)| -.1695          | -.1753          | -.1813E-01
  STD ERROR    |(  .6497E-01)    |(  .6526E-01)    |(  .4456E-01)

E10       (  0)|  .1532          |  .2569
  STD ERROR    |(  .1367        )|(  .1215        )

ESQR      (  0)| -.7421E-01      | -.5610E-01
  STD ERROR    |(  .2724E-01)    |(  .2365E-01)

BAKKE     (  0)|  .1039          |  .1141
  STD ERROR    |(  .1478        )|(  .1485        )

ANNHRS    (  0)|  .2107          |  .1200E-01
  STD ERROR    |(  .2724        )|(  .2465        )

LNANHR    (  0)| -.4930          |  .2891
  STD ERROR    |(  .8178        )|(  .6907        )

LNAHXE    (  0)|  .1011E-02
  STD ERROR    |(  .6802E-02)

LNAHE2    (  0)|  .4275E-01
  STD ERROR    |(  .2547E-01)

C         (  0)|  10.23          |  9.901          |  3.012
  STD ERROR    |(  .4594        )|(  .4179        )|(  1.713        )

AGE10     (  0)                                    | -1.223
  STD ERROR                                        |(  1.060        )

AGE2      (  0)                                    |  .2525
  STD ERROR                                        |(  .2124        )

AGE3      (  0)                                    | -.1765E-01
  STD ERROR                                        |(  .1376E-01)
----------------------------------------------------------------------
```

Table II.1.1, continued
(5) General/Family Practice

```
                     (  1)            (  2)            (  3)
COMMAND/LINE  |OLSQ       / 14 |OLSQ       / 20 |OLSQ       / 25 |
SAMPLED ON    |OK         (  0)|OK         (  0)|OK         (  0)|
N/NUM CONSTR  |       776/  0  |       776/  0  |       776/  0  |
EQN STD ERR   |  .4248         |  .4248         |  .2765         |
R-SQUARED     |  0.226         |  0.224         |  0.079         |
------------------------------------------------------------------
DEP VARIABLE  |LNINC      (  0)|LNINC      (  0)|LNANHR     (  0)|
------------------------------------------------------------------

D77        (  0)| -.1308          | -.4150E-01      | -.1823E-01
   STD ERROR    |(  .6831E-01)    |(  .3103E-01)    |(  .2021E-01)

DINCOR     (  0)|  .1520          |  .1552          |  .5183E-01
   STD ERROR    |(  .3571E-01)    |(  .3564E-01)    |(  .2314E-01)

DSOLO      (  0)| -.1421          | -.1413          |  .7010E-02
   STD ERROR    |(  .3608E-01)    |(  .3608E-01)    |(  .2343E-01)

E10        (  0)|  .3237          |  .3077
   STD ERROR    |(  .6031E-01)    |(  .5847E-01)

ESQR       (  0)| -.7557E-01      | -.7044E-01
   STD ERROR    |(  .1376E-01)    |(  .1131E-01)

BAKKE      (  0)|  .3909E-01      |  .3959E-01
   STD ERROR    |(  .4396E-01)    |(  .4378E-01)

ANNHRS     (  0)| -.2667          | -.2778
   STD ERROR    |(  .9511E-01)    |(  .9096E-01)

LNANHR     (  0)|  1.092          |  1.124
   STD ERROR    |(  .3021       ) |(  .2593       )

LNAHXE     (  0)| -.3818E-02
   STD ERROR    |(  .2605E-02)

LNAHE2     (  0)|  .5382E-02
   STD ERROR    |(  .9057E-02)

C          (  0)|  9.867          |  9.807          |  1.795
   STD ERROR    |(  .1915       ) |(  .1578       ) |(  .7907       )

AGE10      (  0)                                    | -.4305
   STD ERROR                                        |(  .4857       )

AGE2       (  0)                                    |  .9415E-01
   STD ERROR                                        |(  .9639E-01)

AGE3       (  0)                                    | -.7237E-02
   STD ERROR                                        |(  .6193E-02)
------------------------------------------------------------------
```

Table II.1.1, continued
(6) General Surgery

```
                    (  1)          (  2)          (  3)
COMMAND/LINE   |OLSQ       / 14 |OLSQ      / 20 |OLSQ      / 25 |
SAMPLED ON     |OK        (   0)|OK       (   0)|OK       (   0)|
N/NUM CONSTR   |      706/   0  |     706/   0  |     706/   0  |
EQN STD ERR    |  .4412         |  .4424        |  .2814        |
R-SQUARED      |  0.171         |  0.164        |  0.045        |
--------------------------------------------------------------------
DEP VARIABLE   |LNINC     (   0)|LNINC    (   0)|LNANHR   (   0)|
--------------------------------------------------------------------

D77        (   0)|  .5708E-01    | -.3674E-01    | -.2748E-01
  STD ERROR      |(  .8057E-01)  |(  .3375E-01)  |(  .2144E-01)

DINCOR     (   0)|  .1897        |  .1906        |  .2156E-01
  STD ERROR      |(  .3529E-01)  |(  .3535E-01)  |(  .2252E-01)

DSOLO      (   0)| -.2141        | -.2132        | -.1025E-01
  STD ERROR      |(  .3554E-01)  |(  .3563E-01)  |(  .2269E-01)

E10        (   0)|  .2867        |  .3321
  STD ERROR      |(  .8171E-01)  |(  .7977E-01)

ESQR       (   0)| -.8029E-01    | -.6970E-01
  STD ERROR      |(  .1656E-01)  |(  .1495E-01)

BAKKE      (   0)| -.4653E-01    | -.5370E-01
  STD ERROR      |(  .7149E-01)  |(  .7163E-01)

ANNHRS     (   0)| -.5838E-01    | -.9717E-01
  STD ERROR      |(  .9121E-01)  |(  .8789E-01)

LNANHR     (   0)|  .2658E-01    |  .3113
  STD ERROR      |(  .2939      )|(  .2552      )

LNAHXE     (   0)|  .3840E-02
  STD ERROR      |(  .2970E-02)

LNAHE2     (   0)|  .1514E-01
  STD ERROR      |(  .1040E-01)

C          (   0)|  10.66        |  10.52        |  2.238
  STD ERROR      |(  .2477      )|(  .2245      )|(  1.176      )

AGE10      (   0)                                | -.8681
  STD ERROR                                      |(  .7035      )

AGE2       (   0)                                |  .1683
  STD ERROR                                      |(  .1370      )

AGE3       (   0)                                | -.1423E-01
  STD ERROR                                      |(  .8704E-02)
--------------------------------------------------------------------
```

Table II.1.1, continued
(7) Internal Medicine

```
                       (  1)            (  2)            (  3)
COMMAND/LINE   |OLSQ       / 14 |OLSQ       / 20 |OLSQ       / 25 |
SAMPLED ON     |OK         (  0)|OK         (  0)|OK         (  0)|
N/NUM CONSTR   |        605/  0 |        605/  0 |        605/  0 |
EQN STD ERR    | .3971          | .3987          | .2790          |
R-SQUARED      | 0.201          | 0.192          | 0.016          |
-------------------------------------------------------------------
DEP VARIABLE   |LNINC     (  0)|LNINC     (  0)|LNANHR    (  0)|
-------------------------------------------------------------------

D77       (  0)| -.2127         | -.9356E-01     | -.1151E-01
  STD ERROR    |( .7196E-01)    |( .3326E-01)    |( .2325E-01)

DINCOR    (  0)| .1416          | .1366          | .3334E-01
  STD ERROR    |( .3504E-01)    |( .3511E-01)    |( .2444E-01)

DSOLO     (  0)| -.1911         | -.1945         | .1706E-01
  STD ERROR    |( .3586E-01)    |( .3596E-01)    |( .2518E-01)

E10       (  0)| .3060          | .2846
  STD ERROR    |( .7135E-01)    |( .6872E-01)

ESQR      (  0)| -.8962E-01     | -.6638E-01
  STD ERROR    |( .1673E-01)    |( .1360E-01)

BAKKE     (  0)| -.2323E-01     | -.2719E-01
  STD ERROR    |( .6542E-01)    |( .6565E-01)

ANNHRS    (  0)| -.1046         | -.1298
  STD ERROR    |( .9507E-01)    |( .9488E-01)

LNANHR    (  0)| .4043          | .5775
  STD ERROR    |( .2837      )  |( .2677      )

LNAHXE    (  0)| -.5320E-02
  STD ERROR    |( .2898E-02)

LNAHE2    (  0)| .2278E-01
  STD ERROR    |( .1014E-01)

C         (  0)| 10.48          | 10.31          | 1.290
  STD ERROR    |( .2204      )  |( .2072      )  |( 1.028      )

AGE10     (  0)                                  | -.1545
  STD ERROR                                      |( .6357      )

AGE2      (  0)                                  | .3736E-01
  STD ERROR                                      |( .1276      )

AGE3      (  0)                                  | -.3131E-02
  STD ERROR                                      |( .8327E-02)
-------------------------------------------------------------------
```

Table II.1.1, continued
(8) Neurological Surgery

```
                 (  1)          (  2)          (  3)
COMMAND/LINE   |OLSQ     / 14  |OLSQ     / 20  |OLSQ     / 25 |
SAMPLED ON     |OK       (   0)|OK       (   0)|OK       (   0)|
N/NUM CONSTR   |       184/   0|       184/   0|       184/   0|
EQN STD ERR    | .4525         | .4531         | .2611         |
R-SQUARED      | 0.111         | 0.098         | 0.099         |
--------------------------------------------------------------
DEP VARIABLE   |LNINC   (   0)|LNINC   (   0)|LNANHR  (   0)|
--------------------------------------------------------------

D77     (  0)| -.1795        | .7024E-01     | .1562E-01
  STD ERROR  |( .1715       )|( .6785E-01)   |( .3887E-01)

DINCOR  (  0)| .1982         | .2038         | .8692E-01
  STD ERROR  |( .7374E-01)   |( .7369E-01)   |( .4162E-01)

DSOLO   (  0)| -.1237        | -.1148        | .3709E-01
  STD ERROR  |( .7068E-01)   |( .6974E-01)   |( .4002E-01)

E10     (  0)| .1996         | .8669E-01
  STD ERROR  |( .1996       )|( .1780       )

ESQR    (  0)| -.3309E-01    | -.1738E-01
  STD ERROR  |( .4443E-01)   |( .3645E-01)

BAKKE   (  0)| -.1396        | -.1738
  STD ERROR  |( .1419       )|( .1395       )

ANNHRS  (  0)| -.2789        | -.2394
  STD ERROR  |( .2125       )|( .1746       )

LNANHR  (  0)| 1.065         | .8027
  STD ERROR  |( .8032       )|( .5476       )

LNAHXE  (  0)| -.1232E-01
  STD ERROR  |( .7777E-02)

LNAHE2  (  0)| .7592E-02
  STD ERROR  |( .3574E-01)

C       (  0)| 10.84         | 11.00         | -2.855
  STD ERROR  |( .5863       )|( .4546       )|( 2.344       )

AGE10   (  0)                                | 2.374
  STD ERROR                                  |( 1.433       )

AGE2    (  0)                                | -.4610
  STD ERROR                                  |( .2855       )

AGE3    (  0)                                | .2809E-01
  STD ERROR                                  |( .1853E-01)
--------------------------------------------------------------
```

Table II.1.1, continued
(9) Obstetrics/Gynecology

```
                    (   1)            (   2)            (   3)
COMMAND/LINE   |OLSQ      / 14  |OLSQ      / 20  |OLSQ      / 25  |
SAMPLED ON     |OK        (   0)|OK        (   0)|OK        (   0)|
N/NUM CONSTR   |       735/   0 |       735/   0 |       735/   0 |
EQN STD ERR    |  .3977         |  .3974         |  .3085         |
R-SQUARED      |  0.235         |  0.234         |  0.068         |
-------------------------------------------------------------------
DEP VARIABLE   |LNINC     (   0)|LNINC     (   0)|LNANHR    (   0)|
-------------------------------------------------------------------

D77       (   0)| -.5605E-01     | -.2590E-01     | -.7434E-03
   STD ERROR    |(  .6552E-01)   |(  .3023E-01)   |(  .2348E-01)

DINCOR    (   0)|  .1116         |  .1101         |  .2073E-01
   STD ERROR    |(  .3330E-01)   |(  .3324E-01)   |(  .2585E-01)

DSOLD     (   0)| -.1975         | -.1975         | -.2243E-01
   STD ERROR    |(  .3187E-01)   |(  .3177E-01)   |(  .2459E-01)

E10       (   0)|  .3783         |  .3865
   STD ERROR    |(  .7520E-01)   |(  .7003E-01)

ESQR      (   0)| -.9439E-01     | -.8994E-01
   STD ERROR    |(  .1484E-01)   |(  .1408E-01)

BAKKE     (   0)| -.1276         | -.1270
   STD ERROR    |(  .6268E-01)   |(  .6252E-01)

ANNHRS    (   0)| -.1267         | -.1493
   STD ERROR    |(  .7657E-01)   |(  .7178E-01)

LNANHR    (   0)|  .5144         |  .6149
   STD ERROR    |(  .2441       )|(  .2023       )

LNAHXE    (   0)| -.1502E-02
   STD ERROR    |(  .2744E-02)

LNAHE2    (   0)|  .7689E-02
   STD ERROR    |(  .8747E-02)

C         (   0)|  10.66         |  10.59         |  3.210
   STD ERROR    |(  .2131       )|(  .1969       )|(  1.169       )

AGE10     (   0)                                  | -1.373
   STD ERROR                                      |(  .7131       )

AGE2      (   0)                                  |  .2954
   STD ERROR                                      |(  .1414       )

AGE3      (   0)                                  | -.2128E-01
   STD ERROR                                      |(  .9134E-02)
-------------------------------------------------------------------
```

Table II.1.1, continued
(10) Opthalmology

```
                   (    1)          (    2)          (    3)
COMMAND/LINE  |OLSQ      / 14  |OLSQ      / 20  |OLSQ      / 25  |
SAMPLED ON    |OK        (   0)|OK        (   0)|OK        (   0)|
N/NUM CONSTR  |     246/   0   |     246/   0   |     246/   0   |
EQN STD ERR   |  .4790         |  .4832         |  .2789         |
R-SQUARED     |  0.184         |  0.163         |  0.110         |
--------------------------------------------------------------------
DEP VARIABLE  |LNINC     (   0)|LNINC     (   0)|LNANHR    (   0)|
--------------------------------------------------------------------

D77      (   0)|  .1099          |  .9066E-01     | -.2884E-01
  STD ERROR    |( .1203       )  |( .6256E-01)    |( .3589E-01)

DINCOR   (   0)|  .1286          |  .1272         |  .7163E-01
  STD ERROR    |( .6553E-01)     |( .6597E-01)    |( .3801E-01)

DSOLO    (   0)| -.1549          | -.1547         | -.2557E-01
  STD ERROR    |( .7067E-01)     |( .7124E-01)    |( .4096E-01)

E10      (   0)|  .2258          |  .2582
  STD ERROR    |( .1434       )  |( .1346       )

ESQR     (   0)| -.9456E-01      | -.6627E-01
  STD ERROR    |( .3029E-01)     |( .2677E-01)

BAKKE    (   0)| -.2077          | -.2013
  STD ERROR    |( .1135       )  |( .1142       )

ANNHRS   (   0)| -.1484          | -.2178
  STD ERROR    |( .2156       )  |( .2147       )

LNANHR   (   0)|  .2374          |  .7170
  STD ERROR    |( .5523       )  |( .5221       )

LNAHXE   (   0)|  .8049E-03
  STD ERROR    |( .6543E-02)

LNAHE2   (   0)|  .4152E-01
  STD ERROR    |( .1749E-01)

C        (   0)|  11.22          |  10.94         | -1.372
  STD ERROR    |( .3724       )  |( .3573       ) |( 1.678       )

AGE10    (   0)                                   |  1.472
  STD ERROR                                       |( 1.027       )

AGE2     (   0)                                   | -.2991
  STD ERROR                                       |( .2033       )

AGE3     (   0)                                   |  .1880E-01
  STD ERROR                                       |( .1307E-01)
--------------------------------------------------------------------
```

Table II.1.1, continued
(11) Orthopedic Surgery

```
                    (  1)              (  2)              (  3)
COMMAND/LINE   |OLSQ        / 14  |OLSQ        / 20  |OLSQ        / 25  |
SAMPLED ON     |OK          (   0)|OK          (   0)|OK          (   0)|
N/NUM CONSTR   |        227/   0  |        227/   0  |        227/   0  |
EQN STD ERR    |  .4138           |  .4138           |  .2768           |
R-SQUARED      |  0.194           |  0.186           |  0.053           |
-------------------------------------------------------------------------
DEP VARIABLE   |LNINC     (   0)  |LNINC     (   0)  |LNANHR    (   0)  |
-------------------------------------------------------------------------

D77       (  0)|  .2035           |  .3953E-01       |  .1671E-01
  STD ERROR    |( .1288          )|( .5637E-01)      |( .3747E-01)

DINCOR    (  0)|  .1241           |  .1376           |  .6281E-01
  STD ERROR    |( .6564E-01)      |( .6492E-01)      |( .4339E-01)

DSOLO     (  0)| -.1773           | -.1803           |  .1757E-01
  STD ERROR    |( .6173E-01)      |( .6132E-01)      |( .4063E-01)

E10       (  0)|  .1773           |  .2367
  STD ERROR    |( .1663          )|( .1581          )

ESQR      (  0)| -.5888E-01       | -.6480E-01
  STD ERROR    |( .3810E-01)      |( .3431E-01)

BAKKE     (  0)| -.2452           | -.2549
  STD ERROR    |( .1344          )|( .1342          )

ANNHRS    (  0)| -.1537           | -.1636
  STD ERROR    |( .1605          )|( .1589          )

LNANHR    (  0)|  .5250           |  .6343
  STD ERROR    |( .5067          )|( .4629          )

LNAHXE    (  0)|  .8603E-02
  STD ERROR    |( .6073E-02)

LNAHE2    (  0)| -.2325E-02
  STD ERROR    |( .2288E-01)

C         (  0)|  11.17           |  11.18           | -.5878
  STD ERROR    |( .4360          )|( .3964          )|( 2.348          )

AGE10     (  0)                                      |  1.019
  STD ERROR                                          |( 1.458          )

AGE2      (  0)                                      | -.2016
  STD ERROR                                          |( .2961          )

AGE3      (  0)                                      |  .1220E-01
  STD ERROR                                          |( .1968E-01)
-------------------------------------------------------------------------
```

Table II.1.1, continued
(#2) Otolaryngology

```
                 (   1)            (   2)            (   3)
COMMAND/LINE    |OLSQ      / 14   |OLSQ      / 20   |OLSQ      / 25  |
SAMPLED ON      |OK       (    0) |OK       (    0) |OK       (    0)|
N/NUM CONSTR    |      235/    0  |      235/    0  |      235/    0 |
EQN STD ERR     |  .4274          |  .4274          |  .2666         |
R-SQUARED       |  0.336          |  0.330          |  0.136         |
------------------------------------------------------------------------
DEP VARIABLE    |LNINC    (    0) |LNINC    (    0) |LNANHR   (    0)|
------------------------------------------------------------------------

D77       (   0)| -.8981E-01      | -.1003E-01      |  .4143E-01
  STD ERROR     |(  .1174       ) |(  .5647E-01)    |(  .3499E-01)

DINCUR    (   0)|  .1979          |  .2008          |  .7267E-02
  STD ERROR     |(  .5930E-01)    |(  .5915E-01)    |(  .3678E-01)

DSOLO     (   0)| -.1693          | -.1673          | -.1683E-01
  STD ERROR     |(  .6034E-01)    |(  .6031E-01)    |(  .3745E-01)

E10       (   0)|  .5094          |  .5232
  STD ERROR     |(  .1349       ) |(  .1308       )

ESQR      (   0)| -.1317          | -.1156
  STD ERROR     |(  .2818E-01)    |(  .2561E-01)

BAKKE     (   0)| -.4586          | -.4299
  STD ERROR     |(  .1082       ) |(  .1058       )

ANNHRS    (   0)| -.4959E-01      | -.1688
  STD ERROR     |(  .2465       ) |(  .2152       )

LNANHR    (   0)|  .2704          |  .7022
  STD ERROR     |(  .6922       ) |(  .5381       )

LNAHXE    (   0)| -.4345E-02
  STD ERROR     |(  .5740E-02)

LNAHE2    (   0)|  .2599E-01
  STD ERROR     |(  .1911E-01)

C         (   0)|  11.37          |  11.13          | -1.662
  STD ERROR     |(  .3823       ) |(  .3353       ) |(  1.840       )

AGE10     (   0)                                    |  1.548
  STD ERROR                                         |(  1.108       )

AGE2      (   0)                                    | -.2842
  STD ERROR                                         |(  .2163       )

AGE3      (   0)                                    |  .1590E-01
  STD ERROR                                         |(  .1373E-01)
------------------------------------------------------------------------
```

Table II.1.1, continued
(13) Pediatrics

```
                      (   1)            (   2)            (   3)
COMMAND/LINE    |OLSQ        / 14  |OLSQ        / 20  |OLSQ        / 25  |
SAMPLED ON      |OK          (   0)|OK          (   0)|OK          (   0)|
N/NUM CONSTR    |        667/   0  |        667/   0  |        667/   0  |
EQN STD ERR     |  .3527           |  .3527           |  .2408           |
R-SQUARED       |  0.148           |  0.146           |  0.051           |
--------------------------------------------------------------------------
DEP VARIABLE    |LNINC       (   0)|LNINC       (   0)|LNANHR      (   0)|
--------------------------------------------------------------------------

D77       (   0)| -.7635E-01       | -.4519E-01       | -.3890E-01
  STD ERROR     |(  .6248E-01)     |(  .2842E-01)     |(  .1935E-01)

DINCOR    (   0)|  .1092           |  .1093           |  .5495E-01
  STD ERROR     |(  .3053E-01)     |(  .3053E-01)     |(  .2069E-01)

DSOLO     (   0)| -.1275           | -.1277           | -.2535E-01
  STD ERROR     |(  .2918E-01)     |(  .2915E-01)     |(  .1995E-01)

E10       (   0)|  .2952           |  .3073
  STD ERROR     |(  .5919E-01)     |(  .5522E-01)

ESQR      (   0)| -.7826E-01       | -.6801E-01
  STD ERROR     |(  .1370E-01)     |(  .1142E-01)

BAKKE     (   0)|  .1465E-01       |  .1165E-01
  STD ERROR     |(  .5939E-01)     |(  .5935E-01)

ANNHRS    (   0)| -.5433E-01       | -.8201E-01
  STD ERROR     |(  .1061       )  |(  .1026       )

LNANHR    (   0)|  .2258           |  .3763
  STD ERROR     |(  .3285       )  |(  .2967       )

LNAHXE    (   0)| -.1516E-02
  STD ERROR     |(  .2813E-02)

LNAHE2    (   0)|  .1450E-01
  STD ERROR     |(  .1095E-01)

C         (   0)|  10.18           |  10.07           |  2.586
  STD ERROR     |(  .1913       )  |(  .1750       )  |(  .7701       )

AGE10     (   0)                                      | -.9854
  STD ERROR                                           |(  .4820       )

AGE2      (   0)                                      |  .2088
  STD ERROR                                           |(  .9781E-01)

AGE3      (   0)                                      | -.1460E-01
  STD ERROR                                           |(  .6443E-02)
--------------------------------------------------------------------------
```

Table II.1.1, continued
(14) Psychiatry

```
                      (  1)            (  2)            (  3)
COMMAND/LINE    |OLSQ       / 14 |OLSQ       / 20 |OLSQ       / 25 |
SAMPLED ON      |OK         (  0)|OK         (  0)|OK         (  0)|
N/NUM CONSTR    |       758/   0 |       758/   0 |       758/   0 |
EQN STD ERR     |  .3888         |  .3897         |  .2744         |
R-SQUARED       |  0.173         |  0.167         |  0.062         |
-----------------------------------------------------------------------
DEP VARIABLE    |LNINC      (  0)|LNINC      (  0)|LNANHR     (  0)|
-----------------------------------------------------------------------

D77       (  0)|  .9496E-01     | -.2167E-01     | -.1984E-01
   STD ERROR   |( .6187E-01)    |( .2866E-01)    |( .2022E-01)

DINCOR    (  0)|  .1092         |  .1086         |  .9680E-01
   STD ERROR   |( .3173E-01)    |( .3178E-01)    |( .2206E-01)

DSOLO     (  0)| -.1738         | -.1756         | -.4378E-01
   STD ERROR   |( .4667E-01)    |( .4677E-01)    |( .3289E-01)

E10       (  0)|  .2574         |  .2624
   STD ERROR   |( .6740E-01)    |( .6530E-01)

ESQR      (  0)| -.4927E-01     | -.6019E-01
   STD ERROR   |( .1449E-01)    |( .1334E-01)

BAKKE     (  0)| -.1016         | -.1030
   STD ERROR   |( .4901E-01)    |( .4911E-01)

ANNHRS    (  0)| -.1384         | -.1031
   STD ERROR   |( .9415E-01)    |( .9042E-01)

LNANHR    (  0)|  .7538         |  .6250
   STD ERROR   |( .2560       ) |( .2234       )

LNAHXE    (  0)|  .6533E-02
   STD ERROR   |( .3115E-02)

LNAHE2    (  0)| -.1874E-01
   STD ERROR   |( .1063E-01)

C         (  0)|  10.21         |  10.33         |  1.756
   STD ERROR   |( .1717       ) |( .1605       ) |( 1.044       )

AGE10     (  0)                                  | -.6268
   STD ERROR                                     |( .6391       )

AGE2      (  0)                                  |  .1517
   STD ERROR                                     |( .1271       )

AGE3      (  0)                                  | -.1187E-01
   STD ERROR                                     |( .8233E-02)
-----------------------------------------------------------------------
```

Table II.1.1, continued
(15) Urology

```
                     (   1)            (   2)            (   3)
COMMAND/LINE    |OLSQ      / 14 |OLSQ      / 20 |OLSQ      / 25 |
SAMPLED ON      |OK        (  0)|OK        (  0)|OK        (  0)|
N/NUM CONSTR    |      222/  0  |      222/  0  |      222/  0  |
EQN STD ERR     |  .3954        |  .3951        |  .2578        |
R-SQUARED       |  0.093        |  0.086        |  0.023        |
-----------------------------------------------------------------
DEP VARIABLE    |LNINC     (  0)|LNINC     (  0)|LNANHR    (  0)|
-----------------------------------------------------------------

D77       (  0)|  .1418         |  .7986E-02    |  .3497E-01
  STD ERROR    |(  .1176       )|(  .5411E-01)  |(  .3508E-01)

DINCOR    (  0)|  .4327E-01     |  .4101E-01    |  .3649E-01
  STD ERROR    |(  .5765E-01)   |(  .5758E-01)  |(  .3820E-01)

DSOLO     (  0)| -.1361         | -.1454        | -.1266E-01
  STD ERROR    |(  .5679E-01)   |(  .5598E-01)  |(  .3646E-01)

E10       (  0)|  .2601         |  .3135
  STD ERROR    |(  .1405       )|(  .1336      )

ESQR      (  0)| -.5360E-01     | -.5581E-01
  STD ERROR    |(  .3243E-01)   |(  .2719E-01)

BAKKE     (  0)|  .1284         |  .1154
  STD ERROR    |(  .1409       )|(  .1403      )

ANNHRS    (  0)|  .4123         |  .3864
  STD ERROR    |(  .2098       )|(  .2085      )

LNANHR    (  0)| -1.266         | -1.103
  STD ERROR    |(  .5906       )|(  .5690      )

LNAHXE    (  0)|  .6735E-02
  STD ERROR    |(  .5286E-02)

LNAHE2    (  0)|  .1442E-02
  STD ERROR    |(  .2082E-01)

C         (  0)|  10.16         |  10.15        |  3.951
  STD ERROR    |(  .4296       )|(  .4110      )|(  2.162      )

AGE10     (  0)                                 | -1.659
  STD ERROR                                     |(  1.354      )

AGE2      (  0)                                 |  .3814
  STD ERROR                                     |(  .2751      )

AGE3      (  0)                                 | -.2557E-01
  STD ERROR                                     |(  .1820E-01)
-----------------------------------------------------------------
```

Table II.1.1, continued
(16) Anesthesiology

```
                     (   1)            (   2)            (   3)
COMMAND/LINE   |OLSQ      / 14  |OLSQ      / 20  |OLSQ      / 25  |
SAMPLED ON     |OK        (   0)|OK        (   0)|OK        (   0)|
N/NUM CONSTR   |      232/   0  |      232/   0  |      232/   0  |
EQN STD ERR    |  .3333         |  .3327         |  .2661         |
R-SQUARED      |  0.095         |  0.090         |  0.076         |
-------------------------------------------------------------------
DEP VARIABLE   |LNINC     (   0)|LNINC     (   0)|LNANHR    (   0)|
-------------------------------------------------------------------

D77       (  0)| -.1770E-01     | -.2486E-01     |  .3533E-01
   STD ERROR   |(  .1050       )|(  .4453E-01)   |(  .3550E-01)

DINCOR    (  0)|  .1455         |  .1465         |  .5921E-01
   STD ERROR   |(  .4614E-01)   |(  .4570E-01)   |(  .3619E-01)

DSOLO     (  0)| -.5576E-01     | -.5426E-01     | -.2175E-01
   STD ERROR   |(  .4503E-01)   |(  .4493E-01)   |(  .3599E-01)

DCHIEF    (  0)|  .4092E-01     |  .3891E-01     |  .2074E-01
   STD ERROR   |(  .4595E-01)   |(  .4578E-01)   |(  .3649E-01)

DHOSPS    (  0)| -.1580E-01     | -.1712E-01     | -.3864E-01
   STD ERROR   |(  .5926E-01)   |(  .5915E-01)   |(  .4737E-01)

E10       (  0)|  .2390         |  .2040
   STD ERROR   |(  .1197       )|(  .1128       )

ESQR      (  0)| -.3984E-01     | -.5125E-01
   STD ERROR   |(  .2717E-01)   |(  .2488E-01)

BAKKE     (  0)| -.5243E-01     | -.4979E-01
   STD ERROR   |(  .7540E-01)   |(  .7520E-01)

ANNHRS    (  0)| -.1431         | -.7826E-01
   STD ERROR   |(  .1651       )|(  .1546       )

LNANHR    (  0)|  .4843         |  .1967
   STD ERROR   |(  .5071       )|(  .4380       )

LNAHXE    (  0)|  .4991E-03
   STD ERROR   |(  .5090E-02)

LNAHE2    (  0)| -.2154E-01
   STD ERROR   |(  .1963E-01)

C         (  0)|  10.48         |  10.61         |  2.807
   STD ERROR   |(  .2793       )|(  .2534       )|(  1.980       )

AGE10     (  0)                                  | -1.257
   STD ERROR                                     |(  1.246       )

AGE2      (  0)                                  |  .2878
   STD ERROR                                     |(  .2560       )

AGE3      (  0)                                  | -.2183E-01

   STD ERROR                                     |(  .1718E-01)
-------------------------------------------------------------------
```

Table II.1.1, continued
(17) Pathology

```
                    (   1)           (   2)           (   3)
COMMAND/LINE   |OLSQ       / 14 |OLSQ       / 20 |OLSQ       / 25 |
SAMPLED ON     |OK         (  0)|OK         (  0)|OK         (  0)|
N/NUM CONSTR   |      260/    0 |      260/    0 |      260/    0 |
EQN STD ERR    |  .3741         |  .3750         |  .2990         |
R-SQUARED      |  0.176         |  0.166         |  0.038         |
--------------------------------------------------------------------
DEP VARIABLE   |LNINC     (   0)|LNINC     (   0)|LNANHR    (   0)|
--------------------------------------------------------------------

D77       (  0)|  .6379E-01     |  .7030E-01     | -.6500E-01
   STD ERROR   |( .9613E-01)    |( .4830E-01)    |( .3807E-01)

DINCOR    (  0)|  .2792         |  .2781         |  .5620E-01
   STD ERROR   |( .4869E-01)    |( .4873E-01)    |( .3858E-01)

DSOLO     (  0)| -.1486         | -.1541         |  .1162
   STD ERROR   |( .7368E-01)    |( .7373E-01)    |( .5811E-01)

DCHIEF    (  0)|  .1487         |  .1441         | -.1765E-03
   STD ERROR   |( .4810E-01)    |( .4794E-01)    |( .3821E-01)

DHOSPS    (  0)| -.2658E-01     | -.2820E-01     | -.4138E-01
   STD ERROR   |( .6900E-01)    |( .6892E-01)    |( .5472E-01)

E10       (  0)|  .1294         |  .1336
   STD ERROR   |( .1429      )  |( .1411      )

ESQR      (  0)| -.4896E-01     | -.2130E-01
   STD ERROR   |( .3431E-01)    |( .3024E-01)

BAKKE     (  0)|  .2246E-01     |  .1605E-01
   STD ERROR   |( .8855E-01)    |( .8835E-01)

ANNHRS    (  0)| -.2155         | -.1672
   STD ERROR   |( .1596      )  |( .1568      )

LNANHR    (  0)|  .2866         |  .3826
   STD ERROR   |( .3588      )  |( .3554      )

LNAHXE    (  0)| -.9822E-04
   STD ERROR   |( .5358E-02)

LNAHE2    (  0)|  .3539E-01
   STD ERROR   |( .2068E-01)

C         (  0)|  10.54         |  10.36         |  1.886
   STD ERROR   |( .3032      )  |( .2866      )  |( 2.727      )

AGE10     (  0)                                  | -.6602
   STD ERROR                                     |( 1.729      )

AGE2      (  0)                                  |  .1325
   STD ERROR                                     |( .3591      )

AGE3      (  0)                                  | -.8647E-02

   STD ERROR                                     |( .2444E-01)
--------------------------------------------------------------------
```

Table II.1.1, continued
(18) Radiology

```
                (  1)           (  2)           (  3)
COMMAND/LINE  |OLSQ       / 14 |OLSQ       / 20 |OLSQ       / 25 |
SAMPLED ON    |OK        (  0) |OK        (  0) |OK        (  0) |
N/NUM CONSTR  |      244/   0  |      244/   0  |      244/   0  |
EQN STD ERR   | .3828          | .3813          | .2633          |
R-SQUARED     | 0.123          | 0.123          | 0.039          |
------------------------------------------------------------------
DEP VARIABLE  |LNINC     (  0) |LNINC     (  0) |LNANHR    (  0) |
------------------------------------------------------------------

D77      (  0)| -.1828E-01     | .6665E-04      | -.2732E-01
  STD ERROR   |( .1073        )|( .5073E-01)    |( .3506E-01)

DINCOR   (  0)| .1141          | .1150          | -.2275E-01
  STD ERROR   |( .5421E-01)    |( .5393E-01)    |( .3696E-01)

DSOLO    (  0)| -.2114         | -.2119         | -.5158E-01
  STD ERROR   |( .7301E-01)    |( .7259E-01)    |( .4896E-01)

DCHIEF   (  0)| .7357E-01      | .7367E-01      | -.5159E-01
  STD ERROR   |( .5055E-01)    |( .5033E-01)    |( .3478E-01)

DHOSPS   (  0)| .3353E-01      | .3315E-01      | -.2733E-01
  STD ERROR   |( .6116E-01)    |( .6089E-01)    |( .4197E-01)

E10      (  0)| .3259          | .3247
  STD ERROR   |( .1334        )|( .1295        )

ESQR     (  0)| -.8108E-01     | -.7474E-01
  STD ERROR   |( .3464E-01)    |( .2871E-01)

BAKKE    (  0)| -.6425E-01     | -.6509E-01
  STD ERROR   |( .9141E-01)    |( .9098E-01)

ANNHRS   (  0)| .9367E-02      | -.7639E-02
  STD ERROR   |( .1947        )|( .1870        )

LNANHR   (  0)| -.1435E-01     | .6174E-01
  STD ERROR   |( .5716        )|( .5121        )

LNAHXE   (  0)| -.1048E-02
  STD ERROR   |( .5587E-02)

LNAHE2   (  0)| .7969E-02
  STD ERROR   |( .2422E-01)

C        (  0)| 10.62          | 10.58          | .1644
  STD ERROR   |( .3094        )|( .2844        )|( 2.076        )

AGE10    (  0)                                  | .4411
  STD ERROR                                     |( 1.319        )

AGE2     (  0)                                  | -.6373E-01
  STD ERROR                                     |( .2734        )

AGE3     (  0)                                  | .2106E-02

  STD ERROR                                     |( .1851E-01)
------------------------------------------------------------------
```

equations and the hours equation, (2) all variables in the earnings equations incorporating experience (including the hours- experience interaction terms, when present), (3) all variables in the earnings equations incorporating any measure of medical practice hours (again including hours- experience interactions, when present), and (4) all earnings- equation variables relating to practice type (the incorporated and solo practice dummy variables, and in the case of hospital- based specialties, the more- than- one- hospital and department- chief dummy variables). With reference to the equation incorporating hours- experience interactions, a test of the significance of the interaction terms is also presented. Finally, for the hours equation significance tests are provided for the practice- type dummy variables and for the age variables (age, age- squared, and age- cubed).[3]

In both forms (with and without hours- experience interactions) the earnings functions are highly significant statistically, accounting for between nine and 33 percent of the variance in reported net practice earnings. Focusing on the more parsimonious equation, the coefficients of determination (R^2s) provide an indication of the variation in explanatory power across specialties:

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[3] In earlier estimates utilizing data only from the 1977 survey a set of variables related to numbers and ages of children (dummy variables for the presence of children less than six, of children over six, and of both age groups, and numbers of children in each age group) were also tested in the hours equation. Although these variables were unavailable in the 1976 survey in any event, in the 1977 estimates they were found to be insignificant for all specialties other than gastroenterology, general surgery and psychiatry.

Table II.1.2

SIGNIFICANCE TESTS FOR INDEPENDENT VARIABLE GROUPS
1976-77 SPECIALTY EARNINGS AND HOURS FUNCTIONS

Equation 1. Earnings function with hours-experience interactions.
Equation 2. Earnings function without hours-experience interactions.
Equation 3. Hours function.

	EXPERIENCE VARIABLES		HOURS-EXPERIENCE INTERACTIONS	HOURS		PRACTICE TYPE			AGE	EQUATION		
EQUATION NO:	1	2	1	1	2	1	2	3	3	1	2	3
ALLERGY	2.4	0.6	62.3	58.5	39.0	2.9	2.3	45.1	13.4	0.1	0.0	25.3
CARDIOVASCULAR DISEASE	2.6	1.7	22.2	50.6	85.0	0.0	0.0	2.3	6.5	0.0	0.0	0.1
DERMATOLOGY	0.1	0.0	82.5	57.7	28.2	0.3	0.3	67.0	0.0	0.0	0.0	0.4
GASTROENTEROLOGY	5.0	4.6	18.5	4.5	4.0	1.4	1.4	10.8	0.1	0.0	0.0	0.0
GENERAL/FAMILY PRACTICE	0.0	0.0	33.7	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0	0.0
GENERAL SURGERY	0.0	0.0	5.0	10.8	45.1	0.0	0.0	49.8	0.0	0.0	0.0	0.0
INTERNAL MEDICINE	0.0	0.0	3.2	0.0	0.0	0.0	0.0	36.9	13.4	0.0	0.0	15.2
NEUROLOGICAL SURGERY	60.4	88.3	28.7	32.1	33.6	0.2	0.3	9.7	0.4	2.2	1.9	0.5
OBSTETRICS/GYNECOLOGY	0.0	0.0	64.0	0.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0	0.0
OPTHALMOLOGY	0.2	0.4	4.6	3.5	12.0	0.4	0.5	9.1	0.0	0.0	0.0	0.0
ORTHOPEDIC SURGERY	7.6	3.9	36.7	21.1	14.6	0.0	0.0	35.4	5.8	0.0	0.0	5.9
OTOLARYNGOLOGY (E.N.T.)	0.0	0.0	38.2	4.4	1.9	0.0	0.0	87.0	0.0	0.0	0.0	0.0
PEDIATRICS/PEDIATRIC SURGERY	0.0	0.0	40.0	6.6	3.0	0.0	0.0	0.4	0.2	0.0	0.0	0.0
PSYCHIATRY/CHILD PSYCHIATRY	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UROLOGY	7.5	3.2	44.1	24.2	14.7	1.9	1.1	48.3	41.7	2.1	1.3	52.6
ANESTHESIOLOGY	17.9	8.0	52.9	80.8	85.1	0.2	0.2	19.0	1.0	3.4	2.0	2.2
PATHOLOGY	26.8	35.7	20.9	37.0	56.5	0.0	0.0	4.6	97.5	0.0	0.0	27.6
RADIOLOGY	14.6	3.4	93.5	98.7	90.2	0.1	0.1	53.7	23.7	0.2	0.1	31.0

(1) Allergy	.15	(10) Opthalmology	.16
(2) Cardiovascular disease	.23	(11) Orthopedic surgery	.19
(3) Dermatology	.23	(12) Otolaryngology	.33
(4) Gastroenterology	.23	(13) Pediatrics	.15
(5) General/family practice	.22	(14) Psychiatry	.17
(6) General surgery	.16	(15) Urology	.09
(7) Internal medicine	.19	(16) Anesthesiology	.09
(8) Neurological surgery	.10	(17) Pathology	.17
(9) Obstetrics/gynecology	.23	(18) Radiology	.12

In contrast to the earnings equations, the hours equations fail to reach the five percent significance level for six specialties (allergy, internal medicine, orthopedic surgery, urology, pathology and radiology) and explain only between two and 18 percent of the variance in medical practice hours. However, in light of the limited information available concerning the physician, his family status and his practice, this is perhaps not surprising. Also, since the hours equations are of only derivative interest (as will become clear below), the relative lack of explanatory power is not of great concern.

The significance of the experience variables is clearly indicated by Table II.1.2, especially in the more parsimonious equation (excluding the hours- experience interactions). In this more parsimonious form experience variables as a group are significant at least at the five percent level in all specialties other than neurological surgery, anesthesiology and pathology; moreover, in all specialties the signs of the experience coefficients conform to *a priori* expectations (a positive coefficient on experience and a negative coefficient on experience- squared) in this parsimonious equation.[4] Because the hours- experience interaction terms are significant at the five percent

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[4] Actual evaluation of the equation at appropriate levels of hours is required to assess the implications of experience for earnings in the version of the equation including hours- experience interactions.

level for only three specialties (general surgery, internal medicine and opthalmology), attention is restricted in the remainder of this discussion to the more parsimonious version of the equation.

If experience is generally found to be highly significant, the same can definitely not be said about the hours variables. In only seven of the eighteen specialities are the significance levels of the hours variables found to be less than five percent. With the exceptions of obstetrics/gynecology and otolaryngology, the hours variables are statistically significant only in medical specialties: gastroenterology, general/family practice, internal medicine, pediatrics and psychiatry.[5] As will be discussed in greater detail below, these findings are consistent with the hypothesis that competition is significantly stronger, i.e., the price elasticities of demand are significantly higher, in the medical specialties than in surgical and hospital- related specialties. In all cases in which the hours variables are statistically significant (and in most other cases as well) the anticipated pattern of signs is found, with a positive sign on the natural logaritm of hours and a negative sign on hours; thus, the elasticity of earnings with respect to practice hours is generally observed to decline with increasing hours.

Practice- type variables as a group are highly significant in all specialties. With reference to the individual practice- type variables, among the hospital- based specialists only in pathology is there a significant

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[5] In this and subsequent discussions of medical versus surgical versus hospital- based specialties, following Goodman (1975) psychiatry is classified as a "medical" specialty, although this treatment deviates from usual conventions (which classify psychiatry as an "other" specialty). However, as will become apparent, psychiatry in most dimensions exhibits most extremely the characteristics generally exhibited by the medical specialties, providing some substantive justification for this classificatory treatment.

positive increment in earnings (of about 15 percent, ceteris paribus) associated with status as a department chief. Practice at more than one hospital has effectively no influence on earnings in any of the three hospital- based specialties.

In virtually all specialties reported earnings are substantially higher for incorporated practitioners, with percentage increments as indicated:

(1) Allergy	21%	(10) Opthalmology	14%
(2) Cardiovascular disease	12	(11) Orthopedic surgery	15
(3) Dermatology	18	(12) Otolaryngology	22
(4) Gastroenterology	4	(13) Pediatrics	12
(5) General/family practice	17	(14) Psychiatry	11
(6) General surgery	21	(15) Urology	4
(7) Internal medicine	15	(16) Anesthesiology	16
(8) Neurological surgery	23	(17) Pathology	32
(9) Obstetrics/gynecology	12	(18) Radiology	12

Conversely, solo practice is associated with significantly lower reported earnings (by comparison to non- solo practice):

(1) Allergy	-5%	(10) Opthalmology	-14%
(2) Cardiovascular disease	-31	(11) Orthopedic surgery	-16
(3) Dermatology	-8	(12) Otolaryngology	-15
(4) Gastroenterology	-16	(13) Pediatrics	-12
(5) General/family practice	-13	(14) Psychiatry	-16
(6) General surgery	-19	(15) Urology	-14
(7) Internal medicine	-18	(16) Anesthesiology	-5
(8) Neurological surgery	-11	(17) Pathology	-14
(9) Obstetrics/gynecology	-18	(18) Radiology	-19

It might be argued that practice- type variables, subject to the control of the physician, are inappropriately included as independent variables in the estimation of the earnings functions. To a degree this may be true, and one possible explanation for the failure, in the preliminary analysis, to find significant region- residence effects may be that these are associated with differential opportunities for incorporated and group practice. However, as noted previously, it would also be expected that reporting error (probably downward biased) would be less in the case of incorporated and group

practitioners, and it is for this reason that these variables were represented in the earnings functions. Thus, their coefficients should not necessarily be interpreted as indicative of real earnings differences across different types of practice.

Age at medical school graduation is found to have a negative conditional relationship with earnings in most specialties, notably so in the three cases in which this variable is statistically significant: dermatology (-21 percent), otolaryngology (-35 percent), and psychiatry (-10 percent).

Turning to the hours equation, the age variables are found to be statistically significant for all specialties other than allergy, cardiology, internal medicine, orthopedic surgery, urology, pathology and radiology. In all cases hours of practice are predicted to decline at advanced ages, although the rate of decline increases with age in twelve specialties but declines with age in the other six. Over the earlier phase of the career hours either decline continuously or decline, rise and then again decline.

Practice- type variables are statistically significant in the hours equation only for cardiology, pediatrics, psychiatry and pathology. An examination of the individual practice- type variables indicates that, with the exception of pathology (in which only the solo practice variable is statistically significant, with a positive sign, implying at increase in annual practice hours of 12 percent), the effective practice- type variable is the incorporated practice dummy. The sign on the incorporated- practice variable is positive in all specialties other than dermatology and radiology (for which near- zero and entirely insignificant coefficients are estimated). And in the five specialties in which the incorporated- practice variable is statistically significant, substantial positive effects are estimated:

cardiology (14 percent), general practice (5.3 percent), neurological surgery (9 percent), pediatrics (6 percent), and psychiatry (10 percent).

1.4 EXPERIENCE, PRACTICE HOURS AND PREDICTED EARNINGS

To indicate the effects on earnings of experience and annual hours of medical practice, Table II.1.3 provides evaluations of the earnings functions at five-year age intervals (from 30 to 70) for a representative physician, assuming graduation from medical school at age 26, an incorporated nonsolo practice, annual medical hours predicted from the estimated hours function, and in the case of hospital- based specialties, practice as a non- chief in one hospital. In each case the specified value of a dummy variable characterizes the modal group for that variable (although the modal group might differ if values of all dummy variables were considered simultaneously).

Earnings by age and specialty presented in Table II.1.3 represent predicted mean, or expected, earnings ($\hat{Y}$) at predicted mean hours of practice ($\hat{H}$). Because the dependent variables in the earnings and hours functions are natural logarithms, simply to evaluate the estimated functions at the specified values of the explanatory variables would result in the median rather than the mean predicted value, since the conditional distribution is assumed to be log normal (positively skewed) with the mean of the logarithm equal to the median of the antilogarithm (Aitchison and Brown, 1957). To derive the mean it is necessary to take into account the variance of the distribution around the logarithmic predicted value. Thus, if u is the predicted value of the logarithm and s is the standard error of the estimated regression, then the predicted mean of the antilog (mean predicted hours or

Table II.1.3

PREDICTED HOURS AND EARNINGS

BY AGE AND SPECIALTY

	Y	H	W_m	$\eta_{Y,H}$		Y	H	W_m	$\eta_{Y,H}$
ALLERGY					GASTROENTEROLOGY				
30	9.240	2.527	0.0	0.0	30	9.240	3.462	0.0	0.0
35	50.626	2.562	2.68	0.136	35	50.059	3.224	5.09	0.328
40	55.325	2.540	2.99	0.137	40	52.711	3.105	5.54	0.326
45	58.055	2.481	3.32	0.142	45	54.330	3.052	5.80	0.326
50	58.544	2.402	3.61	0.148	50	54.576	3.021	5.88	0.325
55	56.786	2.321	3.78	0.154	55	53.201	2.972	5.81	0.325
60	53.036	2.254	3.76	0.160	60	50.111	2.868	5.65	0.323
65	47.753	2.215	3.51	0.163	65	45.418	2.678	5.45	0.321
70	41.500	2.217	3.04	0.163	70	39.452	2.390	5.25	0.318
	490.4					472.2			
CARDIOLOGY					GENERAL PRACTICE				
30	9.240	3.498	0.0	0.0	30	42.512	3.412	2.19	0.176
35	59.957	3.195	1.58	0.084	35	47.149	3.331	2.81	0.199
40	66.661	3.074	1.59	0.074	40	50.554	3.281	3.28	0.213
45	71.218	3.061	1.69	0.072	45	52.361	3.243	3.60	0.223
50	73.003	3.101	1.79	0.076	50	52.327	3.201	3.84	0.235
55	71.710	3.139	1.81	0.079	55	50.385	3.136	4.06	0.253
60	67.406	3.120	1.67	0.077	60	46.657	3.034	4.32	0.281
65	60.563	2.991	1.35	0.066	65	41.433	2.883	4.64	0.323
70	52.031	2.719	0.62	0.043	70	35.139	2.676	5.00	0.381
	595.1					476.9			
DERMATOLOGY					GENERAL SURGERY				
30	9.240	2.629	0.0	0.0	30	9.240	3.184	0.0	0.0
35	52.149	2.271	3.52	0.153	35	55.439	3.127	0.13	0.007
40	54.735	2.142	4.31	0.169	40	60.412	3.133	0.13	0.007
45	55.954	2.140	4.42	0.169	45	63.580	3.165	0.08	0.004
50	55.449	2.197	4.09	0.162	50	64.620	3.193	0.02	0.001
55	52.993	2.251	3.67	0.156	55	63.426	3.180	0.05	0.002
60	48.620	2.232	3.44	0.158	60	60.111	3.095	0.21	0.011
65	42.594	2.079	3.61	0.176	65	54.961	2.911	0.54	0.028
70	35.291	1.766	4.26	0.213	70	48.371	2.620	1.05	0.057
	481.7					539.8			

Note: Last element in Y column for each specialty is present value of expected lifetime earnings. Earnings and hours in thousands.

Tabel 1.1.3, continued

INTERNAL MEDICINE

	Y	H	W_m	$\eta_{Y,H}$
30	45.111	3.122	2.49	0.172
35	49.766	3.105	2.80	0.175
40	53.130	3.095	3.02	0.176
45	54.868	3.084	3.15	0.177
50	54.789	3.066	3.21	0.180
55	52.876	3.034	3.20	0.184
60	49.296	2.980	3.15	0.191
65	44.368	2.900	3.08	0.201
70	36.520	2.789	2.98	0.216
	491.4			

NEUROLOGICAL SURGERY

	Y	H	W_m	$\eta_{Y,H}$
30	9.240	2.755	0.0	0.0
35	70.216	3.152	1.07	0.048
40	71.980	3.319	0.17	0.008
45	73.034	3.285	0.36	0.016
50	73.337	3.121	1.30	0.055
55	72.717	2.907	2.67	0.107
60	71.240	2.711	4.04	0.154
65	69.264	2.585	4.92	0.184
70	67.246	2.574	4.87	0.186
	622.0			

OBSTETRICS/GYNECOLOGY

	Y	H	W_m	$\eta_{Y,H}$
30	9.240	3.463	0.0	0.0
35	56.012	3.247	2.25	0.130
40	61.038	3.156	2.78	0.144
45	63.760	3.130	3.01	0.148
50	63.712	3.117	3.06	0.150
55	60.752	3.067	3.11	0.157
60	55.114	2.935	3.32	0.177
65	47.333	2.689	3.76	0.214
70	38.151	2.320	4.42	0.269
	533.3			

OPTHALMOLOGY

	Y	H	W_m	$\eta_{Y,H}$
30	9.240	2.560	0.0	0.0
35	63.050	2.724	2.87	0.124
40	66.566	2.755	2.83	0.117
45	67.679	2.686	3.33	0.132
50	66.313	2.559	4.14	0.160
55	62.674	2.418	4.93	0.190
60	57.277	2.298	5.40	0.217
65	50.808	2.227	5.30	0.232
70	43.933	2.232	4.55	0.231
	580.4			

ORTHOPEDIC SURGERY

	Y	H	W_m	$\eta_{Y,H}$
30	9.240	3.011	0.0	0.0
35	69.805	3.160	2.59	0.117
40	73.028	3.196	2.54	0.111
45	73.729	3.145	2.81	0.120
50	71.878	3.037	3.25	0.137
55	67.701	2.907	3.69	0.159
60	61.675	2.782	3.97	0.179
65	54.444	2.686	3.95	0.195
70	46.677	2.641	3.57	0.202
	604.8			

OTOLARYNGOLOGY

	Y	H	W_m	$\eta_{Y,H}$
30	9.240	2.553	0.0	0.0
35	55.347	2.829	4.39	0.225
40	63.545	2.957	4.36	0.203
45	68.180	2.949	4.72	0.204
50	68.533	2.841	5.37	0.223
55	64.613	2.675	6.05	0.251
60	57.229	2.492	6.47	0.282
65	47.757	2.323	6.37	0.310
70	37.705	2.194	5.70	0.332
	548.7			

Table II.1.3, concluded

PEDIATRICS

Age	Y	H	W_m	$\eta_{Y,H}$
30	36.925	3.189	1.33	0.115
35	40.967	3.045	1.70	0.127
40	44.073	2.990	1.93	0.131
45	45.929	2.986	2.02	0.131
50	46.298	2.999	2.01	0.130
55	45.080	2.997	1.96	0.131
60	42.336	2.947	1.93	0.135
65	38.280	2.821	1.97	0.145
70	33.239	2.600	2.09	0.163
	413.6			

PSYCHIATRY

Age	Y	H	W_m	$\eta_{Y,H}$
30	9.240	2.814	0.0	0.0
35	47.296	2.789	5.72	0.338
40	50.400	2.802	6.05	0.336
45	52.196	2.828	6.16	0.334
50	52.379	2.842	6.12	0.332
55	50.780	2.819	6.02	0.334
60	47.413	2.735	5.95	0.343
65	42.475	2.573	5.94	0.360
70	36.331	2.326	6.02	0.385
	446.7			

UROLOGY

Age	Y	H	W_m	$\eta_{Y,H}$
30	9.240	3.399	0.0	0.0
35	47.463	3.089	1.39	0.091
40	51.927	2.969	0.78	0.045
45	55.391	2.964	0.79	0.042
50	57.513	3.012	1.17	0.061
55	58.085	3.057	1.49	0.079
60	56.966	3.042	1.36	0.073
65	54.239	2.909	0.40	0.021
70	50.508	2.624	-1.71	-0.089
	478.6			

ANESTHESIOLOGY

Age	Y	H	W_m	$\eta_{Y,H}$
30	9.240	3.209	0.0	0.0
35	48.098	3.083	-0.70	-0.045
40	50.239	3.050	-0.65	-0.042
45	51.119	3.057	-0.71	-0.043
50	50.706	3.053	-0.70	-0.042
55	49.062	2.990	-0.61	-0.037
60	46.314	2.823	-0.40	-0.024
65	42.597	2.530	-0.02	-0.001
70	38.030	2.116	0.56	0.031
	447.1			

PATHOLOGY

Age	Y	H	W_m	$\eta_{Y,H}$
30	9.240	2.459	0.0	0.0
35	52.108	2.370	-0.30	-0.014
40	54.370	2.332	-0.17	-0.007
45	56.120	2.328	-0.16	-0.007
50	57.309	2.343	-0.22	-0.009
55	57.902	2.361	-0.29	-0.012
60	57.884	2.367	-0.32	-0.013
65	57.261	2.345	-0.23	-0.009
70	56.046	2.282	0.03	0.001
	504.4			

RADIOLOGY

Age	Y	H	W_m	$\eta_{Y,H}$
30	9.240	2.600	0.0	0.0
35	52.695	2.725	0.79	0.041
40	56.940	2.797	0.82	0.040
45	59.224	2.816	0.85	0.040
50	59.297	2.786	0.86	0.040
55	57.155	2.712	0.86	0.041
60	53.037	2.602	0.85	0.042
65	47.383	2.464	0.83	0.043
70	40.756	2.308	0.78	0.044
	500.9			

MEAN (ALL SPECIALTIES)

AGE	Y	AGE	Y
30	18.964	35	51.898
40	55.750	45	57.920
50	58.128	55	56.296
60	52.578	65	47.328
70	41.036		

earnings) is $e^{u+.5s^2}$.[6]

In addition to predicted earnings (in thousands of dollars), Table II.1.3 also presents predicted hours of medical practice (in thousands), the marginal wage rate (w_m, in dollars per marginal hour) at the indicated level of hours and the elasticity of earnings with respect to hours ($\eta_{Y,H}$) at that point. Earnings over the internship and residency period (discussed further in the next chapter) are set equal to $9,240 (constant 1972 dollars), the approximate mean 1976-77 level ($13,000 in current 1977 dollars).

The most striking observation from Table II.1.3 is the extremely low level of the marginal wage rate. In contrast to an average wage rate which generally ranges from $15 to $25 per hour, depending on the specialty, marginal wage rates are invariably below $10 per hour and are commonly not significantly different from zero. This is clearly indicated by the following comparison of average and marginal wage rates, evaluating the earnings functions for a representative 45 year old physician at predicted mean specialty practice hours:

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[6] If the focus of interest were on the forecast error of the regression equation, then it would be necessary to take into account the covariances of the estimated coefficients as well. Here, however, the interest is in the variance of earnings _given_ the estimated coefficients, not in the errors associated with the coefficients themselves. Nonetheless, the predicted values would be only slightly increased were the more complex standard error of the forecast were substituted for the standard error of the regression.

	Average Wage	Marginal Wage		Average Wage	Marginal Wage
(1) Allergy	$23.40	$3.32	(10) Opthalmology	$25.20	$3.33
(2) Cardiology	23.27	1.69	(11) Orthopedic surgery	23.44	2.81
(3) Dermatology	26.15	4.42	(12) Otolaryngology	23.12	4.72
(4) Gastroenterology	17.80	5.80	(13) Pediatrics	15.38	2.02
(5) Gen./fam. practice	16.15	3.60	(14) Psychiatry	18.46	6.16
(6) General surgery	20.09	0.08	(15) Urology	18.69	0.79
(7) Internal medicine	17.79	3.15	(16) Anesthesiology	16.72	-0.71
(8) Neurological surgery	22.23	0.36	(17) Pathology	24.11	-0.16
(9) Obstet./gynecology	20.37	3.01	(18) Radiology	21.03	0.85

More interesting is the variation in the elasticity of earnings with respect to hours across the various classes of specialties. Consider the rank- ordering of specialties by elasticity, evaluating the latter at predicted specialty hours for a representative 45 year old physician. Medical specialties are denoted "M", surgical "S" and hospital- based "H". Statistical significance of the hours coefficients is indicated by an asterisk.

Psychiatry	.33	M	*
Gastroenterology	.33	M	*
General/family practice	.22	M	*
Otolaryngology	.20	S	*
Internal medicine	.18	M	*
Dermatology	.17	M	
Obstetrics/gynecology	.15	S	*
Allergy	.14	M	
Ophthalmology	.13	S	
Pediatrics	.13	M	*
Orthopedic surgery	.12	S	
Cardiology	.07	M	
Urology	.04	S	
Radiology	.04	H	
Neurological surgery	.02	S	
General surgery	.00	S	
Pathology	-.01	H	
Anesthesiology	-.04	H	

Thus, of the highest third of the specialties ranked by elasticities of earnings with respect to hours, five of the six are medical specialties. In contrast, all six of the specialties comprising the lowest third are surgical

or hospital- based. The only surgical specialties with statistically significant elasticities are obstetrics/gynecology and otolaryngology (ear, nose, throat), specialties which may well have many characteristics of primary care specialties. If, for the sake of argument, it is assumed that elasticities of output with respect to hours (from the underlying production function) vary relatively little across specialties, then it would appear that demand elasticities are relatively quite high for the primary- care medical specialties but are remarkably low (close to unity) for most surgical and hospital- based specialties. For the latter, increases in output require substantial reductions in effective prices.[7]

Although the general pattern of initially increasing and then decreasing earnings with increases in experience is observed in most specialties, the magnitude of the experience effect varies markedly across specialties, as indicated by the ratios of predicted earnings at age 35 and at age 65 to predicted earnings at age 50:

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[7] This need not imply a decline in price to the patient. Thus, an increase in output may be achievable only if referal fees to primary physicians are significantly increased. Price here, in other words, is the net price received by the physician.

	Y_{35}/Y_{50}	Y_{65}/Y_{50}
(1) Allergy	0.86	0.82
(2) Cardiology	0.82	0.83
(3) Dermatology	0.94	0.77
(4) Gastroenterology	0.92	0.83
(5) General/family practice	0.90	0.79
(6) General surgery	0.86	0.85
(7) Internal medicine	0.91	0.81
(8) Neurological surgery	0.96	0.94
(9) Obstetrics/gynecology	0.88	0.74
(10) Ophthalmology	0.95	0.77
(11) Orthopedic surgery	0.97	0.76
(12) Otolaryngology	0.81	0.70
(13) Pediatrics	0.88	0.83
(14) Psychiatry	0.90	0.81
(15) Urology	0.83	0.94
(16) Anesthesiology	0.95	0.84
(17) Pathology	0.91	1.00
(18) Radiology	0.89	0.80

Inspection of these earnings- experience variations reveals several reasonably distinct classes of specialties:

		Later Decline	
Early Growth	Little	Moderate	Substantial
Little	Neurosurg (S)	Anesthes (H)	Dermatology (M) Opthalmology (S) Ortho surg (S)
Moderate	Pathology (H)	Allergy (M) Gastroent (M) Gen prac (M) Gen surgery (S) Internal med(M) Pediatrics (M) Psychiatry (M) Radiology (H)	Obstet/gyn (S)
High	Urology (S)	Cardiology (M)	Otolaryngology (S)

In general, a high rate of early growth would be expected in those specialties in which skills and capabilities increase substantially with experience. Conversely, a high rate of later decline would be expected in specalties in which either knowledge or physical capabilities deteriorate

significantly with age. In addition to these considerations, which relate primarily to the production side of the physician's practice (the quantity and quality of services which he can provide), it is necessary to consider the "pure" demand side of the system, i.e., the preljudices which patients may have toward younger or older physicians. Thus, for example, the natural clienteles of dermatologists (the relatively young) and of obstetricians (women of child- bearing age) may have aversions to older physicians, and patients may in general view either very young or very old physicians with some skepticism. While beyond the scope of the present discussion, a detailed comparison of the distribution of specialties in these terms might well be illuminating.

1.5 INTERSPECIALTY PRACTICE HOURS AND EARNINGS DIFFERENCES

Table II.1.3 provided predicted earnings by age and specialty. The interpretation of the indicated earnings differences across specialties, however, is somewhat ambiguous, in that practice hours also vary across specialties. To isolate the differences in earnings which would be observed at a common level of practice hours at each age, Table II.1.4 provides evaluations of the earnings functions (mean earnings) at the geometric mean of practice hours across specialties at each age. That table also indicates the marginal wage rate and the elasticity of earnings with respect to hours which would be confronted by a representative physician devoting geometric mean hours of practice in each specialty at each age. The stipulated geometric mean of practice hours is also indicated.

The following ratios of earnings in each specialty to earnings in general practice, at ages 35, 50 and 65, summarize the information presented in Tables II.1.3 and II.1.4:

Table II.1.4

PREDICTED EARNINGS, MARGINAL WAGE RATES AND EARNINGS/HOURS ELASTICITIES AT GEOMETRIC MEAN HOURS

BY SPECIALTY AND AGE

(FOR IDENTIFICATION OF SPECIALTY COLUMNS, SEE P. II.1.20)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
30	Y	9.2	9.2	9.2	9.2	41.4	9.2	44.9	9.2	9.2	9.2	9.2	9.2	36.7	9.2	9.2	9.2	9.2	9.2
	W	0.0	0.0	0.0	0.0	3.76	0.0	2.67	0.0	0.0	0.0	0.0	0.0	1.52	0.0	0.0	0.0	0.0	0.0
	E	0.0	0.0	0.0	0.0	0.28	0.0	0.18	0.0	0.0	0.0	0.0	0.0	0.13	0.0	0.0	0.0	0.0	0.0
	H	3.050																	
35	Y	51.6	59.7	53.8	48.9	45.9	55.4	49.4	70.0	55.3	63.6	69.3	56.0	40.9	43.4	47.4	48.2	51.3	52.9
	W	1.76	1.33	1.21	5.30	4.48	0.37	3.12	2.00	3.10	1.37	3.33	3.67	1.78	5.11	0.87	-0.61	-2.02	0.69
	E	0.10	0.07	0.07	0.32	0.29	0.02	0.19	0.09	0.17	0.06	0.14	0.20	0.13	0.32	0.05	-0.04	-0.12	0.04
	H	2.996																	
40	Y	56.4	66.5	57.0	52.0	49.3	60.4	52.7	71.6	60.5	67.0	72.3	63.6	44.0	51.4	51.9	50.3	53.6	57.1
	W	1.97	1.45	1.34	5.68	4.94	0.45	3.40	2.18	3.48	1.57	3.59	4.28	1.96	5.51	0.81	-0.61	-2.06	0.75
	E	0.10	0.06	0.07	0.32	0.30	0.02	0.19	0.09	0.17	0.07	0.15	0.20	0.13	0.32	0.05	-0.04	-0.11	0.04
	H	2.973																	
45	Y	59.3	71.1	58.2	53.8	51.1	63.5	54.5	72.6	63.2	68.4	73.1	68.2	45.9	53.0	55.4	51.2	55.3	59.3
	W	2.09	1.54	1.40	5.89	5.19	0.50	3.55	2.28	3.68	1.65	3.69	4.65	2.06	5.72	0.79	-0.61	-2.11	0.78
	E	0.10	0.06	0.07	0.32	0.30	0.02	0.19	0.09	0.17	0.07	0.15	0.20	0.13	0.32	0.04	-0.04	-0.11	0.04
	H	2.964																	
50	Y	60.1	72.7	57.4	54.1	51.2	64.6	54.4	73.0	63.1	67.4	71.6	69.1	46.2	53.0	57.5	50.8	56.6	59.4
	W	2.16	1.54	1.43	5.96	5.31	0.55	3.60	2.41	3.75	1.73	3.70	4.80	2.11	5.78	0.70	-0.58	-2.11	0.79
	E	0.11	0.06	0.07	0.32	0.31	0.03	0.20	0.10	0.18	0.08	0.15	0.20	0.13	0.32	0.04	-0.03	-0.11	0.04
	H	2.946																	
55	Y	58.5	71.3	54.6	52.8	49.3	63.3	52.4	72.7	60.2	64.3	67.7	65.8	44.9	51.3	57.9	49.1	57.2	57.3
	W	2.20	1.44	1.48	5.89	5.40	0.64	3.63	2.70	3.77	1.89	3.72	4.82	2.14	5.76	0.37	-0.51	-2.02	0.78
	E	0.11	0.06	0.08	0.32	0.32	0.03	0.20	0.11	0.18	0.09	0.16	0.21	0.14	0.33	0.02	-0.03	-0.10	0.04
	H	2.902																	
60	Y	54.7	67.0	50.0	49.8	45.6	60.0	48.7	71.6	54.7	59.2	61.8	59.0	42.1	47.9	56.8	46.3	57.4	53.2
	W	2.26	1.22	1.59	5.72	5.55	0.81	3.68	3.29	3.79	2.20	3.82	4.77	2.18	5.70	-0.32	-0.39	-1.79	0.76
	E	0.12	0.05	0.09	0.32	0.34	0.04	0.21	0.13	0.20	0.10	0.17	0.23	0.15	0.34	-0.02	-0.02	-0.09	0.04
	H	2.813																	
65	Y	49.1	60.2	44.1	45.3	40.3	54.8	43.6	69.6	47.2	52.5	54.4	49.6	38.0	43.0	54.4	42.6	57.0	47.5
	W	2.35	0.87	1.77	5.46	5.80	1.08	3.78	4.30	3.85	2.69	4.04	4.70	2.25	5.65	-1.48	-0.19	-1.35	0.74
	E	0.13	0.04	0.11	0.32	0.38	0.05	0.23	0.16	0.22	0.14	0.20	0.25	0.16	0.35	-0.07	-0.01	-0.06	0.04
	H	2.666																	
70	Y	42.1	51.9	37.4	39.8	33.9	48.2	37.4	66.6	38.7	44.8	45.9	39.0	32.9	37.1	50.9	36.1	56.0	40.9
	W	2.48	0.43	2.01	5.16	6.12	1.43	3.95	5.84	3.92	3.34	4.36	4.58	2.35	5.62	-3.21	0.07	-0.63	0.72
	E	0.14	0.02	0.13	0.32	0.44	0.07	0.25	0.22	0.25	0.18	0.23	0.29	0.18	0.37	-0.15	0.00	-0.03	0.04
	H	2.453																	

		Specialty Hours			Geometric Mean Hours		
Age:		35	50	65	35	50	65
(1) Allergy	(M)	1.07	1.12	1.15	1.12	1.17	1.22
(2) Cardiology	(M)	1.27	1.40	1.45	1.30	1.42	1.49
(3) Dermatology	(M)	1.11	1.06	1.03	1.17	1.12	1.09
(4) Gastroenterology	(M)	1.06	1.04	1.10	1.07	1.06	1.12
(5) General/family prac.	(M)	1.00	1.00	1.00	1.00	1.00	1.00
(6) General surgery	(S)	1.18	1.23	1.33	1.21	1.26	1.36
(7) Internal medicine	(M)	1.06	1.05	1.07	1.08	1.06	1.08
(8) Neurological surgery	(S)	1.49	1.40	1.67	1.52	1.43	1.73
(9) Obstetrics/gynecology	(S)	1.19	1.22	1.14	1.20	1.23	1.17
(10) Ophthalmology	(S)	1.34	1.27	1.23	1.39	1.32	1.30
(11) Orthopedic surgery	(S)	1.48	1.37	1.31	1.51	1.40	1.35
(12) Otolaryngology	(S)	1.17	1.31	1.15	1.22	1.35	1.23
(13) Pediatrics	(M)	0.87	0.88	0.92	0.89	0.90	0.94
(14) Psychiatry	(M)	1.00	1.00	1.03	1.05	1.04	1.07
(15) Urology	(S)	1.01	1.10	1.31	1.03	1.12	1.35
(16) Anesthesiology	(H)	1.02	0.97	1.03	1.05	0.99	1.06
(17) Pathology	(H)	1.11	1.10	1.38	1.12	1.11	1.41
(18) Radiology	(H)	1.12	1.13	1.14	1.15	1.16	1.18
MEAN		1.10	1.11	1.14	1.13	1.13	1.17

Because (a) practice hours are relatively high in general practice and (b) general practice has one of the higher elasticities of earnings with respect to hours of practice, the general observation is that the ratio of specialty earnings to general practice earnings would rise if all physicians devoted geometric mean hours to practice at each age.

With the exception of urology at ages 35 and 50, earnings in the surgical specialties are substantially above those in general practice, and the differentials generally widen significantly with age. For all surgical specialties the differentials would be several percentage points greater if all physicians devoted a common level of hours to practice.

In contrast to the surgical specialties, the medical specialties exhibit earnings not substantially greater than those in general practice. The only exceptions to this statement are cardiology, in which earnings correspond much more closely to those in the higher surgical specialties, and pediatrics, in

which earnings fall significantly short of those received by general practitioners. However, as in the case of the surgical specialties, earnings in the medical specialties would rise relative to those in general practice if geometric mean hours were devoted to practice. In fact, the rise relative to general practice would be generally greater in the medical specialties than in the surgical specialties, simply because predicted practice hours tend to be lower in the medical specialties, while elasticities of earnings with respect to hours are higher in medical than in surgical specialties, as discussed above.

The hospital- based specialties exhibit earnings above those in general practice, with the exception of anesthesiology at age 50, but generally correspond more closely to the higher medical specialties than to the surgical specialties.

Chapter 2

RETURNS TO INVESTMENTS IN PHYSICIAN SPECIALIZATION

2.1 ELEMENTS IN THE DERIVATION OF RETURNS TO PHYSICIAN SPECIALIZATION

On the basis of the estimated specialty- specific earnings functions developed in the preceeding chapter, it is possible to derive estimates of the returns to physician specialization. The measure of returns which is utilized is the increase in the present value of expected lifetime earnings attributable to specialization, by comparison to the present value of expected lifetime earnings in general/family practice. As discussed in Part I and demonstrated elsewhere (Dresch 1981), an appropriate adjustment for differences in working hours across occupations (specialties) is provided by evaluation of the earnings functions at the geometric mean of working hours (across occupations/specialties at each age). For purposes of estimating returns to specialization (by comparison to entry into general practice) the geometric mean of practice hours across specialties at each age is employed. Subsequently, in Part III, in which the focus is on the returns to physician training relative to other occupational choices, the geometric mean of working hours across professional, technical and manageral occupations is utilized.

Prior to deriving the estimates of returns to physician training it is necessary to review briefly the elements which must be taken into account in this type of exercise, with consideration for the concrete context of estimating returns to physician specialization. These elements include:

1. the measure of returns to specialization;

2. the treatment of training costs;
3. adjustments of predicted earnings for mortality; and
4. the choice of a discount rate.

2.1.1 The Measure of Returns to Specialization

The most commonly employed measure of returns to investment, including human capital investment, is the internal rate of return, defined as that discount rate which would just equate the stream of gross returns to the investment to its initial cost. Alternative investments can then be ranked according to their internal rates of return, identifying those which are most profitable. A comparison of the internal rate of return to market interest rates provides a basis on which to assess the efficiency of the capital market in allocating capital resources to alternative investment opportunities.

In the present context, however, the internal rate of return is not an ideal measure of returns. As has been discussed, in assessing relative earnings in alternative occupations or occupational specialties, the choice of occupation is a discreet choice. At a point in time one must chose one occupation or another. Given the choice, the level of investment is effectively determined.[1] In this situation, the internal rate of return may provide a very deceptive basis on which to rank the profitability of alternative occupational investments. Consider two alternative occupations, one of which requires a substantial investment which will yield a relatively low rate of return but one which is nonetheless substantially above those available in the market, the other of which will yield a much higher return

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[1] Clearly, different levels of investment are possible, even given the occupational choice. However, for each occupation (specialty) there will be an "optimal" level of investment, and it is this optimal investment which is taken here as "given."

yet but on a very small investment. Under these circumstances it is likely that the investment with the lower internal rate of return will nonetheless be preferable to the investment with the higher internal rate of return, simply because the level of investment is higher. That is, a slight premium on a large investment may well be worth more than a large premium on a much smaller investment. Stated differently, if the level of investment in occupational training were unlimited (with the internal rate of return unaffected by the level of investment), then the internal rate of return would provide a satisfactory gauge of investment returns. Since the level of investment is in fact limited (one can invest only in one's own occupational or specialty choice, given strictures on involuntary servitude), investments with lower internal rates of return may have greater economic value than investments exhibiting higher internal rates of return.

In circumstances in which the magnitude of the investment is limited and investment options are mutually exclusive, an appropriate measure of returns is the present value of the expected earnings stream associated with the investment. Alternative occupations can then be ranked according to these expected present values, net of the costs of schooling or other training. In this case the present value is defined as

$$\text{(II.2.1)} \qquad PV_i = \sum_{a=L+1}^{U} Y_{i,a} \, s_{i,(L,a)} \, (1+r)^{a-L+1}$$

where i is occupation/specialty,

PV is the present value of expected lifetime earnings,

L is the lower bound (exclusive) of the working lifetime (age 18)

U is the upper bound (inclusive) of the working lifetime (age 70)

$Y_{i,a}$ is earnings at age a, net of out of pocket schooling costs,

$s_{i,(L,a)}$ is the probability of survival from age L to age a,

r is the discount rate (income rate of interest).

Thus, PV_i represents the present value at age 18 of expected earnings net of schooling costs through age 70.

Because PV_i is a relatively "uncommon" measure, lacking an intuitive meaning, in the comparison of returns to the choice of occupation i over some benchmark occupation j it is useful to derive a related measure, the "annuity equivalent" of the difference in the present values of net expected earnings:

$$PV_i - PV_j = \sum_{a=L+1}^{U} AN_{i,j}\, s_{i,(L,a)}\, (1+r)^{a-L+1} \tag{II.2.2}$$

or

$$AN_{i,j} = (PV_i - PV_j) \,/\, \left[\sum_{a=L+1}^{U} s_{i,(L,a)}\, (1+r)^{a-L+1} \right] \tag{II.2.3}$$

As the name implies, this "annuity equivalent" is simply the amount which, if received in every year from age 19 to age 70 (conditional on survival to each age), would have the same value as the differential in expected lifetime earnings between the two occupations. In other words, it represents an annualization of the difference in the present value of expected lifetime earnings.

In assessing returns to physician specialization, the comparison specialty (j) is defined as general practice. Thus, the annuity equivalents associated with specialty practice represent the excess (positive or negative) of earnings in any specialty over earnings in general practice, expressed as though the excess were to be paid in equal installments between the ages of 19 and 70.[2]

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[2] The statement that the annuity equivalents represent equal annual installments having a present value equal to the difference in the present value of expected lifetime earnings is a slight oversimplfication, as will be discussed. Rather, these installments would increase at the rate of secular earnings growth, i.e., at the rate at which the lifecycle age-earnings profile shifts upward over time. This results from the fact that it is possible to abstract from the upward shift in the real earnings profile if earnings by age at a point in time are discounted at a rate equal to the real interest rate minus the rate of real secular earnings growth, a rate characterized here as the "income rate of interest."

2.1.2 Schooling and Specialty- Training Costs

Because a condition for entry into any physician specialty is completion of a medical degree, it is unnecessary in principle to take into account any costs associated with schooling and training prior to the internship and residency period in assessing the returns to specialization (as opposed to choice of a medical career *per se*). However, to facilitate the analysis of returns to physican training relative to alternative occupational choices (Part III), physician lifetime earnings net of post- high- school educational costs are derived. For this purpose, mean 1977 tuition and out- of- pocket schooling costs in four- year- public colleges are assumed to be incurred in each year between the ages of 19 and 22. In constant 1972 dollars this cost is $414 per year. For the medical schooling period, a high estimate of medical school tuition and related costs of $3,667 per year (about $5,100 in current 1977 dollars) is stipulated for the four year period (between ages 23 and 26, inclusive). In assessing these costs it should be noted that they exclude costs which would be incurred in any event, whether the individual were in school or not. Because foregone earnings are implicitly taken into account in comparing occupation i (requiring schooling) to any occupation j not requiring schooling, to include such costs as room and board would be to engage in double counting (unless these costs were deducted from the earnings of the individual not undertaking schooling).

It should be noted that, although the derived present values of expected future earnings are reduced by treatment of post- high- school educational costs as negative earnings, because the same negative elements are incorporated in the general practice and specialty practice present values, this treatment of schooling costs has no effect on the differences between the

specialty and general practice present values or on the corresponding annuity equivalents.

The only costs of the choice of specialty over general practice are the foregone earnings associated with a more prolonged period of graduate medical training. In monetary terms the investment in specialization is simply the difference between earnings which would have been received as a general practitioner and compensation received in graduate training. Thus, the magnitude of the investment in specialization is a direct function of the duration of the training period.

Because the length of the training period varies even within specialties, the approximate median for each specialty is assumed. Thus, years of internship and residency training stipulated to be required for entry into each specialty are as follows:

(1) Allergy	4 yrs.	(10) Opthalmology	4 yrs.
(2) Cardiovascular disease	4	(11) Orthopedic surgery	5
(3) Dermatology	4	(12) Otolaryngology	4
(4) Gastroenterology	4	(13) Pediatrics	3
(5) General/family practice	2	(14) Psychiatry	4
(6) General surgery	4	(15) Urology	4
(7) Internal medicine	3	(16) Anesthesiology	4
(8) Neurological surgery	5	(17) Pathology	4
(9) Obstetrics/gynecology	4	(18) Radiology	4

Over the years of internship and residency training the trainee is assumed to receive a stipend (in constant 1972 dollars) of $9,240 per year, increasing in real terms at the rate of real secular earnings growth.[3] Although trainee compensation varies somewhat by specialty, interspecialty differences for first- year trainees are in fact slight. Thus, the 1977 first- training- year

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[3] As will be discussed, discounting at the income rate of interest involves the assumption that earnings at any level of experience (age) rise over time at some specified rate. Thus, the observed increase in real earnings profiles over time is taken into account by utilizing a discount rate which is less than the stipulated real rate of interest by the observed rate of real secular growth.

average of $13,000 (deflated to 1972 dollars) provides a reasonable estimate for purposes of comparison across specialties. Because trainee compensation does tend to rise significantly with the duration of the training period, the resultant estimates are conservative, tending to understate the returns to those specialties requiring protracted training.

2.1.3 Mortality Adjustments

In deriving the present value of lifetime earnings (equation II.2.1) predicted earnings in any year are multiplied by the probability of survival to that age. Unfortunately, the choice of mortality rates in the estimation of survival probabilities is not unambiguous. Substantial differences in age-specific mortality, across occupations and across physician specialties, are observed, but it is not clear to what these differences should be attributed. On the one hand, the differences may simply reflect differential ex ante mortality prospects of persons who chose particular careers, thus having no causal relationship to the occupation entered. On the other hand, these differences may reflect the consequences of occupational experience (exposure to various risks) for mortality prospects of incumbents. The actual relationship is probably due to some varying degree to both factors. Fortunately, differences in survival probabilities acorss occupations and medical specialties become significant only at relatively advanced ages, when the effect of discounting (to age 18) becomes substantial. Thus, the precise assumption concerning the relationship of occupational or specialty choice to mortality has only second- order consequences for estimates of returns to one choice relative to another. In this analysis the assumption is made that observed differences in age- specific mortality rates across specialties are due to the consequences of specialty choice for mortality.

Adjustments for physician mortality are based in the first instance on age- specific mortality rates of physicians, with subsequent adjustments for differential mortality experience across specialties (Goodman, 1975). The stipulated age- specific mortality rates (per 1000 physicians of each age) are:

Ages 34 and younger	0.7 per 1000
35 to 39	1.4
40 to 44	2.2
45 to 49	4.3
50 to 54	6.6
55 to 59	11.1
60 to 64	18.7
65 to 69	29.4
70 and over	46.4

Specialty- specific standard mortality rates (ratios of actual to expected deaths, assuming for the latter the age- specific mortality rates of all physicians) are:

(1) Allergy	0.874
(2) Cardiovascular disease	0.874
(3) Dermatology	0.890
(4) Gastroenterology	0.874
(5) General/family practice	1.143
(6) General surgery	0.891
(7) Internal medicine	0.834
(8) Neurological surgery	0.867
(9) Obstetrics/gynecology	0.853
(10) Opthalmology	0.799
(11) Orthopedic surgery	0.807
(12) Otolaryngology	0.799
(13) Pediatrics	0.725
(14) Psychiatry	0.960
(15) Urology	0.867
(16) Anesthesiology	0.879
(17) Pathology	0.809
(18) Radiology	0.922

The probability of surviving from any age a to age a+1 is, then,

(II.2.4) $$s_{i,(a,a+1)} = (1 - d_a m_i)$$

where d_a is the age- specific physician mortality rate, and

m_i is the specialty i standard mortality rate.

The probability of survival from age L to any age a' is, then,

(II.2.5) $$s_{i,(L,a')} = \prod_{a=L}^{a'-1} s_{i,(a,a+1)}$$

The implied sequence of survival rates is employed in equation II.2.1 to derive the present value of expected future earnings by specialty.

2.1.4 The Discount Rate

In selecting a discount rate by which to convert expected earnings at any age into their age 18 present value, it is necessary to take into account the fact that the estimated returns to physician training are being derived from cross-sectional estimates of earnings profiles. Thus, the earnings profiles relate earnings to experience (and other variables) at a point in time (1976-77). A physician, however, will receive earnings over time, and with the passage of time the earnings profile can be expected to shift. In employing a cross-sectional earnings profile it is necessary either (a) to specify the precise manner in which the profile will shift (in real terms) over time or (b) to assume (generally implicitly) that the profile will shift equiproportionately, i.e., that the proportionate change in earnings at each level of experience is invariant with experience. Clearly, changes in the age distribution of physicians and in other factors relating to the demand for and supply of physician services could lead to nonequiproportionate shifts in earnings functions.[4] However, in the absence of a fully articulated model explaining the determinants of physician earnings, it is conventional to assume by default that earnings functions will shift equiproportionately. This assumption is made here, but its possible violation should be explicitly

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[4] As will be demonstrated in Part III, earnings functions in other professional occupations shifted in a particularly nonequiproportionate manner over the decade 1967- 77. Specifically, as the relative number of young professionals rose, due to rapid growth in the younger population and to rising levels of educational attainment, earnings of younger professionals declined, absolutely and relative to the earnings of older professionals. Interestingly, available evidence indicates that the opposite occured in medicine. Although the physician population began to increase at a significant rate after 1970, earnings of younger physicians rose dramatically relative to earnings of older physicians, while both experience significant real growth. While the specialty distributions of younger and older physicians might explain some part of this relative rise in earnings at younger ages, the same general phenomenon is observed within individual specialties.

recognized. Evidence of the decade prior to 1977 would indicate that this is a conservative assumption, in that earnings of younger physicians rose more rapidly than those of older physicians. However, there is no basis on which to assert that this will continue to be the case in the future, especially in light of the substantially more rapid growth of the physician population which can be anticipated.

As noted, available evidence does suggest that physician earnings rose at a substantial rate between 1967 and 1977, possibly at a real rate approaching five percent per year (controlling for age). Extrapolating this rate into the future, it is necessary to inflate the earnings function at this compound rate for each year of experience. However, this is equivalent to discounting uninflated earnings at an appropriate real rate of interest minus the rate of secular real earnings growth. Thus, the appropriate real interest rate represents an upper bound on the discount rate, assuming that real physician earnings (by age) are not anticipated to decline.

Ideally, that rate of return which the potential specialist could receive on alternative investments of comparable risk would be employed as an estimate of the appropriate real interest rate (nominal interest rate minus the rate of inflation). For present purposes a real interest rate of between five and ten percent, a rate significantly above those observed historically even on relatively risky assets, is assumed. Because the rate of real secular growth can be expected to be positively associated with the real interest rate, a conservative estimate of the appropriate discount rate for the derivation of the present value of expected future physician earnings would appear to be about five percent. This discount rate (denoted the "income rate of interest," equal to the real interest rate minus the rate of real secular

earnings growth) is assumed in the estimates of returns to physcian specialization.

2.2 ESTIMATED RETURNS TO PHYSICIAN SPECIALIZATION

Having specified all of the variables entering into equation II.2.1, it is possible to derive estimates of the present value of expected lifetime earnings for each specialty. These estimates are presented in Table II.2.1. Two alternative estimates are derived. The first, an hours- adjusted measure, denoted PV_A, assumes hours of medical practice at each age equal to the geometric mean across specialties. The second, an hours- unadjusted measure, denoted PV_U, utilizes medical practice hours actually predicted for the specialty in question. In both cases the present values utilize predicted mean earnings at each age.[5] Thus, the age- and specialty- specific earnings presented in Table II.1.4 are incorporated in PV_A, while those presented in Table II.1.3 are incorporated in PV_U.

As has been discussed, because the gross comparisons of differences in present values are not easily comprehended, in that they accrue over a relatively long period of time, the difference between the present value in each specialty and the present value in general practice can be converted into an annuity- equivalent, i.e., an amount which, if paid in each year between age 19 and age 70 in which the individual was alive, would have the same

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[5] In most cases in the literature in which logaritmic earnings functions are employed to derive predictions of earnings and of returns to occupational choice, the earnings functions are evaluated at specified values of the explanatory variables, without adjustment for the assumed lognormal distribution around the predicted value of the logarithm. As discussed in the preceeding chapter, this results in the estimate of median rather than of mean earnings, while the latter is clearly the appropriate measure of expected earnings for purposes of deriving returns to occupational investments.

TABLE II.2.1

Present Values at Age 18 of Lifetime Earnings and Annuity Equivalents Relative to General Practice

A: Hours adjusted.
U: Hours unadjusted.
PV: Present value, in thousands of dollars.
AN: Annuity equivalent, in dollars.
All dollar amounts in constant (1972) dollars.

		PV_A	AN_A	PV_U	AN_U
ALLERGY	1	501.3	2029.	490.4	760.
CARDIOLOGY	2	592.5	7147.	595.1	6637.
DERMATOLOGY	3	497.7	1828.	481.7	270.
GASTROENTEROLOGY	4	465.0	-8.	472.2	-264.
GENERAL PRACTICE	5	465.2	0.	476.9	0.
GENERAL SURGERY	6	539.2	4156.	539.8	3531.
INTERNAL MEDICINE	7	487.6	1256.	491.4	812.
NEURO. SURGERY	8	620.4	8711.	622.0	8144.
OB/GYN	9	528.2	3535.	533.3	3167.
OPTHALMOLOGY	10	588.6	6907.	580.4	5794.
ORTHOPEDIC SURG.	11	601.4	7629.	604.8	7163.
OTOLARYNGOLOGY	12	555.5	5054.	548.7	4019.
PEDIATRICS	13	412.4	-2948.	413.6	-3534.
PSYCHIATRY	14	454.5	-601.	446.7	-1699.
UROLOGY	15	477.8	711.	478.6	100.
ANESTHESIOLOGY	16	447.6	-985.	447.1	-1669.
PATHOLOGY	17	498.0	1838.	504.4	1543.
RADIOLOGY	18	502.4	2094.	500.9	1351.
MEAN	19	499.1	1906.	499.9	1293.

present value at age 18 as the difference between the specialty and general practice present values. Interpretively, the specialist would be indifferent between receiving his predicted specialty earnings in each year, on the one hand, and receiving the general practitioner's earnings plus the indicated annuity payment. Again, the hours adjusted annuity- equivalent is denoted AN_A, the hours unadjusted annuity- equivalent AN_U. These measures are also presented in Table II.2.1.

A comparison of the adjusted and unadjusted present values of expected lifetime earnings clearly indicates that a failure to adjust physician earnings for hours of work differentials would result in a substantial underestimate of the returns to specialization. The reason for this is relatively easy to identify: First, practice hours in general practice are substantially above geometric mean hours across specialties. Second, the elasticity of earnings with respect to hours is generally higher in general practice than in most specialties.[6] Thus, when the earnings function is evaluated at geometric mean hours, predicted general practitioner earnings decline substantially, while earnings in most specialties are only marginally reduced or are actually increased (as in the case of several of the medical specialties with low hours but relatively high elasticities). As a result, the present values of expected specialty lifetime earnings relative to the present value of expected lifetime earnings in general practice are reduced by between one and six percentage points when the hours- unadjusted measure is employed.

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[6] This finding clearly indicates that increased human capital investment need not imply a higher (marginal) wage rate, contrary to Lindsay's (1971) implicit assumption, thus lending support for the hypothesis suggested above, that elasticities of demand, and hence marginal wage rates, decline with increases in human capital intensity.

On an unadjusted basis four specialties (anesthesiology, psychiatry, gastroenterology and pediatrics) appear to enjoy lifetime earnings significantly lower than general practice, while four others (allergy, dermatology, internal medicine and urology) represent virtually "break- even" propositions. In annuity equivalent terms, specialization in pediatrics is estimated to involve annual losses of about $3500, psychiatry and anesthesiology losses of about $1700. Annuity equivalents in gastroenterology and dermatology are not significantly different from zero, while that of allergy is less than $800.

Evaluating the earnings functions at geometric mean hours, in contrast, allergy, dermatology and (to a lesser extent) internal medicine become relatively profitable specialties, while losses in pediatrics, anesthesiology and especially psychiatry are reduced substantially. Only pediatrics continues to appear to involve a significant loss, on the order of $3000 per year.

The following rank ordering of specialties by the hours- adjusted present value of lifetime earnings gives an overview of the relative returns to alternative specialties:

		PV_A	Ratio to GP	AN_A	PV_U	Ratio to GP	AN_U
Neurological surgery	(S)	$620.4	1.33	$8711	$622.0	1.30	$8144
Orthopedic surgery	(S)	601.4	1.29	7629	$604.8	1.27	7163
Cardiology	(M)	592.5	1.27	7147	595.1	1.25	6637
Opthalmology	(S)	588.6	1.27	6907	580.4	1.22	5794
Otolaryngology	(S)	555.5	1.19	5054	548.7	1.15	4019
General surgery	(S)	539.2	1.16	4156	539.8	1.13	3531
Obstetrics/gynecology	(S)	528.2	1.14	3535	533.3	1.12	3167
Radiology	(H)	502.4	1.08	2094	500.9	1.05	1351
Allergy	(M)	501.3	1.08	2029	490.4	1.03	760
MEAN		499.1	1.07	1906	499.9	1.05	1293
Pathology	(H)	498.0	1.07	1838	504.4	1.06	1543
Dermatology	(M)	497.7	1.07	1828	481.7	1.01	270
Internal medicine	(M)	487.6	1.05	1256	491.4	1.03	812
Urology	(S)	477.8	1.03	711	478.6	1.00	100
General practice	(M)	465.2	1.00	0	476.9	1.00	0
Gastroenterology	(M)	465.0	1.00	-8	472.2	0.99	-264
Psychiatry	(M)	454.5	0.98	-601	446.7	0.94	-1699
Anesthesiology	(H)	447.6	0.96	-935	447.1	0.94	-1699
Pediatrics	(M)	412.4	0.89	-2918	413.6	0.87	-3534

Clearly, the surgical specialties are highly profitable. Of the seven surgical specialties, six are included in the highest seven specialties (neurological surgery, orthopedic surgery, opthalmology, otolaryngology, general surgery and obstetrics/gynecology). Cardiology is the only medical specialty to rank significantly above the mean, while urology is the only surgical specialty to rank below the mean. Of the five lowest specialties, four are medical (general practice, gastroenterology, psychiatry and pediatrics), while one is hospital- based (anesthesiology). The other medical specialties (allergy, dermatology and internal medicine) and hospital- based specialties (pathology and radiology) all are in close proximity to the mean.

In four specialties (neurological surgery, orthopedic surgery, cardiology, opthalmology and otolaryngology) the differentials in the present value of expected lifetime earnings, relative to general practice, are equivalent to annual earnings differentials in excess of $5,000, and in four

others (general surgery, obstetrics/gynecology, radiology and allergy) the annualized earnings differential (relative to general practice) exceeds $2,000. For only four specialties (urology, gastroenterology, psychiatry and anesthesiology) is the return within the range of ± $1,000 on an annualized basis, confering little more than a competitive return, and in three others (pathology, dermatology and internal medicine) the return is modest (equivalent to between $1,000 and $2,000 per year). Only in pediatrics is a significant loss (of about $3,000 per year) incurred.

In summary, with the exception of pediatrics, the investment in physician specialization confers at least a competitive rate of return, and in 12 of the 17 specialties significant economic rents accrue to investments in specialization. However, a failure to adjust for hours of work differentials would result in a substantial underestimation of returns to specialization.

As will be indicated in Part III, although the returns to physician specialization are generally substantial, the economic rents associated with medical training are even higher by comparison to earnings in nonphysician occupations. The rents of specialization are simply additions to the rents associated with relatively unspecialized medical practice.

PART III

OCCUPATIONAL EARNINGS, 1967-77

> To the social critic, a system that selects the future recipients of income streams from human capital according to their success in passing tests devised and imposed by educators is both selecting in large part on the basis of parental resources, culture, effort, and familial ambition and relying on a selection process that may be neither socially nor economically effective...
>
> It is equally easy to look at the pure economics of a system in which at least minimum- quality education at every level is provided nominally free, or nearly free, to all candidates suitably qualified-- though without regard to the foregone earnings to which human capital theory has quite rightly called attention-- and to point out that the combined results of the inevitable fiscal limitation on the total quantity provided, the equally inevitable dependence on rationing by educators who control admissions, and the availability of privately provided education at an extra price, are economic nonsense in almost every dimension of economic theory.
>
> Harry G. Johnson (1972, p. S287)

Chapter 1

OCCUPATIONAL EARNINGS FUNCTIONS

1.1 THE CURRENT POPULATION SURVEY AS A BASIS FOR EARNINGS FUNCTION ESTIMATES

While evidence concerning earnings in physician specialties at a point in time is interesting and useful, to fully assess the economic status of physicians it is necessary to compare physicians to other occupational groups and to examine changes in the relative status of physicians over time. Unfortunately, available data on which to base such an analysis are less than ideal. While reasonably good data are available for a few occupations (e.g., National Science Foundation and National Research Council surveys of doctoral scientists and engineers), in general data of the type provided by the HCFA physician surveys of 1976 and 1977 are unavailable for other occupations.

The only source of comprehensive data on occupational earnings over time is the Annual Demographic File of the Current Population Survey (CPS). The occupational earnings data availalble in the CPS are derived from the March CPS survey, which elicits information on employment and earnings in the prior year. The basic structure of the CPS has changed only slightly since 1968, the first year for which the Annual Demographic File is available. While the occupational classification system was modified in 1971 to conform to the 1970 Census classification, for most occupations earnings can be tracked from 1967 onward. Thus, the CPS provides a consistent source of occupationally comprehensive data over time. Unfortunately, as a basis for estimation of occupational earnings functions the CPS has several severe deficiencies.

Insufficient sample sizes represent the most obvious deficiency of the CPS. Designed primarily to provide statistically significant estimates of unemployment, sample sizes by occupation, especially for professional, technical and managerial occupations, tend to be quite small. To overcome problems of inadequate sample size, the CPS files for the years 1967 through 1978 (exclusive of 1970, for which difficulties in the occupational classification were encountered) have been pooled into three time periods: 1967-69, 1971-74 and 1975-78. Even this combination of years, however, resulted in inadequate sample sizes for many relatively narrowly defined occupations. Thus, it was necessary further to define several occupational categories more broadly than would be desirable. This is the case, for example, with reference to health professionals other than physicians, which includes such diverse groups as pharmacists, optometrists, dentists and podiatrists.

The occupational classification ultimately developed for purposes of this study is indicated in Table III.1.1, which also indicates the sample sizes for each of the three pooled time periods. With the exception of selfemployed farmers, who are excluded from the analysis,[1] the occupational classification system is exhaustive, identifying a comprehensive set of 30 occupations. Of these 30 occupations, 22 comprise the professional, technical and managerial group, although several of these (architects, computer specialists, mathematical specialists, bank officers and health and education

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[1] Selfemployed farmers are excluded from the analysis primarily because of ambiguities in their reported earnings. Because the CPS provides information only on money income and earnings, income in kind is purposely excluded, although this is likely to be significant for many farmers. Also, although ambiguities are likely to be generally present in the case of the selfemployed, the problem of differentiating labor and property income is likely to be especially severe in the case of selfemployed farmers.

administrators) can be identified separately only in the two later time periods.

The most serious deficiency of the CPS as a basis for an analysis of earnings relates to the reporting of income in the public release version of the Annual Demographic File. Ostensibly for purposes of assuring confidentiality of individual respondents, reported earnings have been truncated in each year at $50,000 (current dollars). While this does not present a severe problem in 1967, when $50,000 in current prices corresponded to $61,501 in constant 1972 prices (again employing the implicit Personal Consumption Expenditure deflator), it is severly constraining in 1978, when the nominal $50,000 ceiling corresponded to a constant dollar ceiling of $33,267. Thus, over the eleven year period 1967 to 1978 the effective ceiling was virtually halved, while over much of this period real earnings in many occupations rose.

The severity of the problems associated with the truncation of reported earnings is indicated in Table III.1.2, which presents the proportions of the observations for which truncated earnings are reported, by year and occupation (with occupations identified by sequential numbers, as indicated in Table III.1.1). As is readily apparent, the potential biases introduced by truncation are relatively slight in the early years. Thus, for example, in 1967 only 3.2 percent of physicians were reported as having earnings above the ceiling of $61,501 (constant dollars), and only 1.3 percent of lawyers were reported to have earnings above this level. However, by 1978 the truncation of earnings totally vitiates any analysis of physician earnings, with 44.2 percent above the constant dollar ceiling of $33,267, and the bias will be significant in the case of nonphysician health professionals (19.7 percent

TABLE III.1.1

CPS Occupations and Sample Sizes

	SAMPLE SIZES 1967-69	 1970-74	 1975-78
(1) ACCOUNTANTS	940	1,305	1,470
(2) ARCHITECTS		147	181
(3) COMPUTER SPECIALISTS		520	721
(4) ENGINEERS	2,357	2,429	3,004
(5) LAWYERS	496	734	974
(6) LIBRARIANS, SOCIAL SCIENTISTS	163	308	448
(7) MATHEMATICAL SPECIALISTS		286	310
(8) LIFE & PHYSICAL SCIENTISTS	379	440	548
(9) ENG. & SC. TECHNICIANS	1,360	1,633	1,868
(10) HEALTH PROF. (EX. PHYSICIANS)	447	636	869
(11) PHYSICIANS (MD, OSTEOPATH)	437	601	794
(12) CLERGY	403	503	574
(13) HEALTH TECHNICIANS	154	209	304
(14) OTHER TECHNICIANS	1,677	733	1,090
(15) COLLEGE FACULTY	480	714	837
(16) OTHER TEACHERS	1,326	1,895	2,297
(17) WRITERS, ARTISTS, ENTERTAINERS	1,068	1,046	1,429
(18) PUBLIC ADMINISTRATORS	632	861	1,149
(19) BANK OFFICERS		869	1,014
(20) HEALTH, ED. ADMINISTRATORS		668	876
(21) MANAGERS (TRADE)	894	2,591	2,889
(22) OTH. MANAGERS, ADMINIS.	11,623	10,631	13,534
(23) SALES	4,534	6,128	7,007
(24) CLERICAL	5,533	6,039	6,634
(25) CRAFTS	17,302	20,844	25,019
(26) OPERATIVES (EX. TRANSPORT)	10,290	10,520	12,392
(27) TRANSPORT OPERATIVES	4,522	5,170	6,419
(28) LABORERS (NONFARM)	3,140	4,377	5,845
(29) FARM LABORERS	916	1,175	1,777
(30) SERVICE	4,018	5,722	7,863

Note: Occupations will be identified in most subsequent tables by the sequential numbers indicated above.

above the ceiling) and lawyers (18.3 pecent above the ceiling). For other occupations, however, the problem of a truncated earnings variable continues to be slight even at the end of the period.

While the truncation of the earnings distribution will introduce a downward bias in the estimated earnings functions, the subsequent examination of these functions will indicate that only in the case of physicians do predicted earnings in any period approach the ceiling for that period. Thus, the biases will be relatively small even for lawyers and other health professionals. As a result, any conclusions which can be reached on the basis of these data concerning the relative profitability of alternative occupational choices will represent downward biased estimates, with the degree of bias directly related to the proportion of any occupation's members reporting earnings above the ceiling.

While a comparison of predicted earnings of physicians from the CPS to predicted earnings in other CPS occupations will result in a downward biased estimate of relative physician earnings in the later two periods, for 1977 it is possible to utilize predicted earnings from the equations estimated on the basis of the HCFA survey data. A comparison of predicted (HCFA) 1977 to predicted (CPS) 1967 physician earnings will then permit an estimate of the growth in physician earnings over the decade. Similarly, the present value of physcian lifetime earnings based on the 1976-77 HCFA survey data to the present values from the CPS for other occupations in the same period will result in an only slightly upward biased estimate of returns to the physicians professional training. In short, selective use of the CPS and HCFA data will permit the derivation of bounded estimates of returns to physcian training over time.

Table III.1.2

PERCENTAGE REPORTING EARNINGS ABOVE CEILING, BY OCCUPATION (COLUMN) AND YEAR (ROW)

	Ceiling Earnings (1972 Dollars)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1967	61,501	0	0		0.1	1.3	0	0	0	0.2	0	3.2	0	0	0.2	0	0	0	0.5			0.3	0.6	0.2	0	0.0	0.0	0.0	0	0	0
1968	59,102	0.3	0		0.3	0.3	0	0	0.7	0	2.7	6.1	0	0	0.3	0	0	0.6	0			0	0.7	0.1	0.1	0.0	0.0	0	0	0	0.1
1969	56,497	0.3	0		0.1	7.2	0	0	0	0	1.3	8.1	0	0	0.3	0	0	0.6	0			0.3	0.9	0.6	0.1	0	0	0	0	0	0
1970	54,054																														
1971	51,760	1.2	0	0	0.3	7.4	0	0	0	0	2.4	16.6	0	0	0	0	0.2	1.5	0	2.0	0	0.9	1.3	0.8	0	0	0.0	0	0	0	0
1972	50,000	0.6	5.0	0	0.1	7.9	1.2	0	0	0	6.5	15.4	0.8	0	1.1	0	0	1.5	0.5	0.5	0	0.9	2.0	1.5	0	0.2	0.1	0	0.2	0	0.1
1973	47,393	0.6	0	0	0.8	10.7	2.9	0	0	0	6.3	14.1	0.8	0	0.5	0	0	1.6	0	2.5	1.1	0.8	2.2	1.4	0	0.1	0.1	0.3	0	0.3	0
1974	42,772	0.6	2.7	0	0.3	11.0	1.1	1.2	0.9	1.0	4.6	21.6	0	2.0	0.5	0.5	0	0.8	0.5	0.5	0.6	1.6	2.7	0.9	0.1	0.1	0.1	0.2	0	0.4	0.1
1975	39,557	1.5	0	0	0.6	8.9	1.1	0	2.7	0	9.4	39.4	0	0	1.3	1.1	0	0.6	0	1.8	3.0	0.8	3.6	1.7	0.2	0.1	0.1	0.1	0	0	0.1
1976	37,566	4.1	9.8	0	0.5	14.9	3.0	2.8	1.3	0	11.8	43.4	0	0	1.9	0.4	0	1.4	0	2.6	2.1	0.9	3.8	1.9	0.2	0.1	0.1	0.2	0.1	0	0
1977	35,537	3.0	4.9	0	0.8	16.8	8.3	0	1.7	0	16.7	38.8	0	0	1.3	1.0	0	0.6	0.6	3.0	3.7	1.8	4.7	3.2	0.1	0.2	0	0.4	0	0.2	0
1978	33,267	4.7	3.3	0	2.0	18.3	4.5	1.2	3.1	0.4	19.7	44.2	0.5	1.3	1.4	3.5	0	1.8	0.3	5.5	3.2	3.3	6.6	3.2	0.2	0.3	0.0	0.4	0.3	0.9	0.1

1.2 ESTIMATED OCCUPATIONAL EARNINGS FUNCTIONS

The basic earnings function model estimated for the CPS occupations is identical to that employed in the estimation of the physician specialty earnings functions (equation II.1.3). However, certain differences in the empirical analysis are required. As in the case of the HCFA physician estimates, the dependent variable is the natural logaritm of earnings. In this case, however, earnings are defined as the sum of wages and salaries and income from nonfarm selfemployment. It should be noted that total earnings may include wages, salaries and selfemployment income from more than one job, while assignment to an occupation is based on the principle job. Thus, the earnings functions for occupation i relate total earnings of incumbents in occupation i to various characteristics, whether or not these earnings originate in occupation i. This has the consequence of possibly overstating earnings in those occupations in which incumbents frequently are employed on a subsidiary basis in other occupations. However, the magnitude of any associated errors should be slight.

Unlike the HCFA physician sample, for which a reasonably accurate estimate of the age at which formal schooling was completed (age at medical school graduation) was available, with the CPS no information on educational and work history is available, other than the number of years of schooling completed. Thus, only a crude proxy for experience is possible, defined as age minus years of schooling completed minus six. Because the analysis is restricted to males, for whom postschooling labor force participation is high and continuous, this should result in only minor errors.

In the case of the HCFA physicians analysis it was possible to control for various characteristics of the physician's practice (e.g., solo and incorporated practice dummy variables). The closest parallel in the CPS occupational analysis involves controlling for selfemployment and for employment by government (and, after 1970, for state- local versus federal government employment).

As in the case of the physician earnings function estimates, preliminary attempts were made to control for region of the country, but again this effort was unsuccessful, due in part to the restricted sample sizes. In the final equation estimates, however, dummy variables were included for SMSA and SMSA-central- city residence.

The most complicated extensions of the model estimated for physicians involves the inclusion of years of schooling in the earnings function. For physicians this was unnecessary, since effectively all members of the sample had completed the same level of formal schooling (a medical degree). With reference to the CPS significant variation in years of schooling completed is observed, due in part to the generally more aggregative occupation definitions and in part to the lesser rigidity of entry criteria for most other occupations. To permit a highly nonlinear relationship between years of schooling completed and earnings, a series of dummy variables, designating completion of certain critical levels of schooling [eighth grade, high school graduation, college graduation, and the maximum reported number of years of schooling (18+)] and interactions between the first three of these and years of schooling completed are incorporated in the equations. Thus, it is possible to identify (a) discontinuities in and (b) changes in the slope of the relationship between years of schooling and earnings. It should be noted

that only years of schooling are available, and that interpetation of, e.g., 16 years as equivalent to college graduation is only approximately correct.

Explanatory variables represented in the estimated earnings function thus include:

(1) Experience (age minus years of schooling minus six, in decades)
(2) Experience (in decades) squared
(3) Annual hours of work (in thousands)
(4) Natural logarithm of annual hours of work (in thousands)
(5) Interaction between experience and natural logarithm of annual hours
(6) Interaction between experience squared and natural logarithm of hours
(7) Years of school completed
(8) Dummy variable for completion of eight or more years of school
(9) Dummy variable for completion of twelve or more years of school
(10) Dummy variable for completion of sixteen or more years of school
(11) Dummy variable for completion of eighteen of more years of school
(12) - (14) Interactions between years of school and dummy variables for completion of eight, twelve and sixteen years
(15) Dummy variable for selfemployment (primary job)
(16) Dummy variable for state- local government employment (primary job)
(17) Dummy variable for federal government employment (primary job)
(18) Dummy variable for SMSA residence
(19) Dummy variable for SMSA- central- city residence
(20) - (21 or 22) Dummy variables for each pooled year other than the first

The estimated earnings functions are reported in Tables III.1.3(1) through III.1.3(3) for the 1967-69, 1971-74 and 1975-78 time periods, respectively. Corresponding annual hours functions, the dependent variable of which is the natural logarithm of annual hours (in thousands), are reported in Tables III.1.4(1) through III.1.4(3) for the corresponding time periods. In addition to the schooling- related, residence, and self- and government-employment variables, the hours functions include age (in decades) (age, age squared and age cubed), marital status dummary variables (single, divorced and widowed), dummy variables for presence and ages of children (less than 6, 6-17, both), numbers of children by age, presence and numbers of children in postsecondary schooling, a dummy variable for positive spouse earnings, and

the natural logarithms of spouse hours of work and earnings (if positive). As in the case of the HCFA physician specialty analysis, the hours functions are of only derivative interest, providing the basis for predicting hours of work by age and occupation.

In general, the earnings functions account for a substantial proportion (between 20 and 40 percent) of the variance in earnings, as indicated by the coefficients of determination:

	1967	1972	1977		1967	1972	1977
(1) Accountants	.26	.29	.40	(16) Oth. teachers	.35	.31	.41
(2) Architects	.47	.35	.36	(17) Writers, et al.	.29	.32	.37
(3) Computer spec.		.40	.48	(18) Public admin.	.30	.40	.49
(4) Engineers	.24	.24	.34	(19) Bank officers		.31	.39
(5) Lawyers	.30	.26	.27	(20) Hlth & ed admin.		.27	.28
(6) Librar., soc. sc.	.59	.40	.52	(21) Managers (trade)	.10	.26	.31
(7) Math spec.		.40	.31	(22) Oth. manag. & ad.	.23	.22	.23
(8) Life & phy. sc.	.33	.35	.53	(23) Sales	.33	.30	.36
(9) Eng. & sc. tech.	.28	.37	.43	(24) Clerical	.33	.36	.49
(10) Hlth prof.	.27	.29	.41	(25) Crafts	.22	.23	.30
(11) Physicians	.32	.20	.34	(26) Operatives	.24	.28	.34
(12) Clergy	.17	.16	.14	(27) Trans. oper.	.29	.25	.32
(13) Hlth. tech.	.43	.40	.42	(28) Laborers (ex farm)	.33	.37	.43
(14) Oth. tech.	.32	.39	.46	(29) Farm laborers	.39	.40	.41
(15) College faculty	.40	.47	.55	(30) Service	.38	.46	.52

Following the discussion of the estimated physician specialty earnings functions, Tables III.1.5 and III.1.6 present significance levels of F-statistics for various explanatory variable groups in the earnings and hours functions, respectively. For ease of this discussion, the three time periods will be referred to simply as 1967, 1972 and 1977 (the years for which the functions will be evaluated subsequently).

Considering the earnings function explanatory variable groups, the experience variables (including the hours- experience interaction terms) are statistically highly significant for all occupations in all three time periods. The same is generally true of the hours variables (again including

Table III.1.3(1)

Earnings Functions, 1967-69

	OC 01	OC 02	OC 04	OC 05	OC 06
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.30385	0.95642	-0.08195	-0.60166	0.35315
	(0.12235)	(0.55933)	(0.08399)	(0.24569)	(0.41188)
LN(HOURS)	0.87464	-2.52185	0.55208	2.72867	1.41816
	(0.29681)	(1.64271)	(0.22439)	(0.69750)	(0.70409)
EXPERIENCE	0.22688	0.83684	0.53045	1.22272	1.60802
	(0.11627)	(0.76852)	(0.09916)	(0.33910)	(0.30876)
EXP SQUARED	-0.03036	-0.14076	-0.10717	-0.27822	-0.29283
	(0.02195)	(0.15070)	(0.02259)	(0.06090)	(0.06202)
LN(HRS) * EXP	0.16764	-0.17195	-0.16118	-0.98569	-1.58234
	(0.14262)	(0.96609)	(0.12527)	(0.39428)	(0.40883)
LN(HRS)*EXP SQRD	-0.04204	0.04836	0.04112	0.24992	0.29258
	(0.02697)	(0.19246)	(0.02868)	(0.07400)	(0.08174)
YRS OF SCH (S)	-0.03366	-0.00795	0.04054	0.07020	-0.14339
	(0.03797)	(0.08804)	(0.00685)	(0.04097)	(0.08559)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12	-0.27346				-2.12224
	(0.41128)				(0.86134)
D(S GE 12) * S	0.03857				0.22526
	(0.04070)				(0.09516)
DUMMY S GE 16	0.03442	-2.15524	-0.00244	2.28207	-0.99137
	(0.88659)	(2.50009)	(0.40988)	(3.36692)	(2.31190)
D(S GE 16) * S	0.00918	0.15005	0.00548	-0.13657	0.06872
	(0.05554)	(0.15942)	(0.02558)	(0.20492)	(0.14490)
DUMMY S GE 18	0.20050	-0.18919	0.03923	0.08562	-0.25180
	(0.11658)	(0.23366)	(0.04934)	(0.30247)	(0.26122)
SELF-EMPLOYED	0.13005	0.03177		0.02479	0.02955
	(0.05166)	(0.12680)		(0.06535)	(0.16876)
GOVERNMENT	0.01485	-0.01447	0.00279	0.02759	-0.12322
	(0.03606)	(0.27328)	(0.01938)	(0.08791)	(0.06838)
SMSA	0.13867	0.08443	0.11854	0.35484	0.29332
	(0.03273)	(0.16425)	(0.01797)	(0.07321)	(0.08282)
CENTRAL CITY	-0.05577	-0.15170	-0.06881	-0.17902	-0.16577
	(0.02907)	(0.13168)	(0.01731)	(0.06018)	(0.07107)
INTERCEPT (1967)	8.91853	8.32100	8.11110	7.07375	7.84282
	(0.39217)	(1.38813)	(0.13697)	(0.66050)	(0.76989)
D(1968)	0.08054	0.20481	-0.00662	0.01608	0.04321
	(0.03017)	(0.12168)	(0.01684)	(0.06486)	(0.07287)
D(1969)	0.11885	0.23158	0.05886	0.15527	0.10913
	(0.03124)	(0.13573)	(0.01691)	(0.06642)	(0.07679)
R Squared	0.26283	0.46695	0.24443	0.30276	0.58822
F Statistic	18.24300	3.44930	50.48700	13.00000	11.82500
F d.f.	(18, 921)	(16, 63)	(15, 2341)	(16, 479)	(18, 149)
Standard Error	0.38151	0.42619	0.33581	0.57951	0.36892
Observations	940	80	2357	496	168

Table III.1.3(1), continued

	OC 08	OC 09	OC 10	OC 11	OC 12
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.27807	-0.16691	-0.09829	-0.37749	-0.40855
	(0.22278)	(0.11820)	(0.19214)	(0.20294)	(0.15823)
LN(HOURS)	1.64798	1.09807	1.29555	1.25333	1.23448
	(0.52487)	(0.24054)	(0.57522)	(0.70612)	(0.42018)
EXPERIENCE	1.10139	0.76890	0.99339	0.92806	0.51346
	(0.27463)	(0.11141)	(0.22071)	(0.29066)	(0.25804)
EXP SQUARED	-0.21989	-0.13325	-0.16890	-0.18853	-0.08598
	(0.07039)	(0.02560)	(0.03968)	(0.05029)	(0.05018)
LN(HRS) * EXP	-0.85866	-0.45517	-0.65224	0.02058	-0.11672
	(0.35937)	(0.14878)	(0.26846)	(0.26668)	(0.24145)
LN(HRS)*EXP SQRD	0.17047	0.08093	0.09593	0.00217	0.00195
	(0.09278)	(0.03518)	(0.04844)	(0.04867)	(0.04788)
YRS OF SCH (S)	0.04585	0.06907	0.12242	0.15559	0.03687
	(0.02603)	(0.01476)	(0.03688)	(0.06128)	(0.04156)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		0.13948			-0.71925
		(0.18909)			(0.74233)
D(S GE 12) * S		-0.01525			0.06313
		(0.01735)			(0.06301)
DUMMY S GE 16	-0.51865	0.95084	5.40941		-1.75507
	(1.25717)	(0.73210)	(1.90177)		(2.29233)
D(S GE 16) * S	0.03708	-0.06055	-0.33902		0.08372
	(0.07914)	(0.04475)	(0.11915)		(0.14317)
DUMMY S GE 18	-0.01257		0.49553	-0.16046	-0.17837
	(0.14119)		(0.20862)	(0.29542)	(0.24107)
SELF-EMPLOYED			0.26403	0.20491	
			(0.07151)	(0.07949)	
GOVERNMENT	-0.04073	-0.04078	0.06873	-0.05775	
	(0.04124)	(0.02436)	(0.13838)	(0.10919)	
SMSA	0.12029	0.10069	0.20051	0.06020	0.03883
	(0.04959)	(0.02224)	(0.06841)	(0.08359)	(0.06694)
CENTRAL CITY	-0.17258	-0.08953	-0.06323	-0.06940	-0.05658
	(0.04604)	(0.02402)	(0.07229)	(0.06983)	(0.08172)
INTERCEPT (1967)	7.45723	7.37026	6.06915	6.01868	7.78362
	(0.43565)	(0.19925)	(0.57711)	(0.95253)	(0.46191)
D(1968)	0.08758	0.04229	0.07722	0.06432	-0.09586
	(0.04602)	(0.02255)	(0.07059)	(0.07507)	(0.07257)
D(1969)	0.15312	0.08383	0.14500	0.11578	-0.06450
	(0.04730)	(0.02349)	(0.07062)	(0.07627)	(0.07379)
R Squared	0.33338	0.28299	0.27444	0.31854	0.16547
F Statistic	12.10200	33.12900	10.16600	14.09000	4.78350
F d.f.	(15, 363)	(16, 1343)	(16, 430)	(14, 422)	(16, 386)
Standard Error	0.36387	0.34063	0.60396	0.63989	0.57499
Observations	379	1360	447	437	403

Table III.1.3(1), continued

	OC 13	OC 14	OC 15	OC 16	OC 17
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.65038	-0.34556	-0.11127	-0.22489	0.00183
	(0.25711)	(0.08402)	(0.14933)	(0.08534)	(0.10966)
LN(HOURS)	1.40924	1.47015	0.89403	0.63112	0.51920
	(0.59226)	(0.18616)	(0.27951)	(0.21218)	(0.24528)
EXPERIENCE	0.16897	0.87093	0.76518	0.50798	0.73468
	(0.22647)	(0.08122)	(0.20265)	(0.08941)	(0.10417)
EXP SQUARED	-0.00374	-0.12341	-0.14399	-0.11837	-0.12960
	(0.04571)	(0.01792)	(0.05300)	(0.02162)	(0.02208)
LN(HRS) * EXP	0.51525	-0.42875	-0.19779	-0.09886	-0.24796
	(0.29257)	(0.10675)	(0.24062)	(0.10565)	(0.13428)
LN(HRS)*EXP SQRD	-0.11886	0.03564	0.04336	0.04394	0.03967
	(0.06217)	(0.02375)	(0.06234)	(0.02581)	(0.02963)
YRS OF SCH (S)	-0.01747	-0.00462	0.00992	0.00150	0.05824
	(0.04213)	(0.02793)	(0.02771)	(0.00816)	(0.02956)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12	-0.22792	-0.15830			0.49524
	(0.70483)	(0.31866)			(0.37285)
D(S GE 12) * S	0.02667	0.02949			-0.04169
	(0.06155)	(0.03078)			(0.03435)
DUMMY S GE 16	-2.35240	0.86392	-2.65232	-1.30361	0.07525
	(3.18138)	(0.84109)	(2.19105)	(0.41077)	(0.95625)
D(S GE 16) * S	0.14824	-0.04721	0.16857	0.08648	0.00393
	(0.19609)	(0.05222)	(0.13260)	(0.02542)	(0.05967)
DUMMY S GE 18	0.03918	0.17997	-0.03894	-0.01285	-0.06031
	(0.35064)	(0.09381)	(0.18035)	(0.03998)	(0.10488)
SELF-EMPLOYED	0.31984				-0.16293
	(0.15574)				(0.05004)
GOVERNMENT	-0.07959	-0.15327	0.00114	0.10718	-0.04143
	(0.08518)	(0.02426)	(0.04295)	(0.02894)	(0.04052)
SMSA	0.03541	0.22279	0.04747	0.11058	0.24542
	(0.09080)	(0.02804)	(0.04544)	(0.01888)	(0.03896)
CENTRAL CITY	-0.06715	-0.09867	-0.00263	0.00970	-0.13527
	(0.08525)	(0.02700)	(0.04975)	(0.02414)	(0.03410)
INTERCEPT (1967)	8.98693	8.05552	7.88812	8.48991	7.43034
	(0.49902)	(0.28605)	(0.38807)	(0.12865)	(0.31603)
D(1968)	-0.04990	0.06025	0.05433	0.04702	0.01137
	(0.09129)	(0.02772)	(0.04626)	(0.02093)	(0.03552)
D(1969)	-0.01742	0.08723	0.11417	0.11868	0.06248
	(0.08848)	(0.02748)	(0.04701)	(0.02065)	(0.03600)
R Squared	0.43266	0.31507	0.39871	0.34690	0.28843
F Statistic	5.71970	44.89100	20.51200	46.38800	23.62300
F d.f.	(18, 135)	(17, 1659)	(15, 464)	(15, 1310)	(18, 1049)
Standard Error	0.43110	0.45152	0.41163	0.30602	0.47552
Observations	154	1677	480	1326	1068

Table III.1.3(1), continued

	OC 18	OC 21	OC 22	OC 23	OC 24
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.14188	-0.43501	-0.31925	-0.31685	-0.33502
	(0.15973)	(0.15637)	(0.03743)	(0.06876)	(0.05368)
LN(HOURS)	1.55457	1.74591	1.30794	1.61631	1.58678
	(0.47899)	(0.40467)	(0.11601)	(0.15305)	(0.11015)
EXPERIENCE	0.96206	0.65396	0.64423	0.74117	0.76611
	(0.17216)	(0.15759)	(0.04975)	(0.05144)	(0.04176)
EXP SQUARED	-0.14873	-0.11871	-0.09787	-0.11649	-0.13185
	(0.02737)	(0.03034)	(0.00840)	(0.00923)	(0.00837)
LN(HRS) * EXP	-0.74832	-0.37417	-0.21514	-0.31593	-0.47491
	(0.22012)	(0.19097)	(0.05454)	(0.06428)	(0.05624)
LN(HRS)*EXP SQRD	0.11548	0.08186	0.02527	0.03417	0.08147
	(0.03532)	(0.03715)	(0.00919)	(0.01161)	(0.01144)
YRS OF SCH (S)	-0.00461	0.02441	0.01685	-0.00448	0.01906
	(0.02847)	(0.02130)	(0.00590)	(0.00958)	(0.00593)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12	-0.20457	-0.36144	-0.28965	-0.33066	-0.02282
	(0.36224)	(0.27931)	(0.09701)	(0.14091)	(0.09481)
D(S GE 12) * S	0.02877	0.02925	0.03303	0.04403	0.00863
	(0.03408)	(0.02561)	(0.00854)	(0.01253)	(0.00836)
DUMMY S GE 16	-1.72636	-0.17316	0.06781	1.35665	-0.26185
	(1.19709)	(0.92365)	(0.23553)	(0.46034)	(0.38113)
D(S GE 16) * S	0.11960	0.01521	0.00161	-0.07528	0.02077
	(0.07441)	(0.05757)	(0.01478)	(0.02868)	(0.02342)
DUMMY S GE 18	-0.09210				
	(0.13773)				
SELF-EMPLOYED			-0.24753	-0.07699	
			(0.01248)	(0.02699)	
GOVERNMENT					0.00333
					(0.01165)
SMSA	0.18405	0.21362	0.21798	0.25524	0.14113
	(0.03692)	(0.03594)	(0.01239)	(0.01943)	(0.01316)
CENTRAL CITY	-0.12417	-0.17102	-0.07024	-0.05758	-0.07092
	(0.03903)	(0.03205)	(0.01285)	(0.01773)	(0.01182)
INTERCEPT (1967)	7.64736	7.91747	7.95461	7.67662	7.67379
	(0.38862)	(0.29522)	(0.08937)	(0.11950)	(0.08172)
D(1968)	0.03107	0.04809	0.02286	0.02109	0.05181
	(0.03818)	(0.03364)	(0.01255)	(0.01846)	(0.01237)
D(1969)	0.04514	0.09733	0.06348	0.09459	0.08464
	(0.03873)	(0.03369)	(0.01269)	(0.01862)	(0.01256)
R Squared	0.30305	0.26082	0.23295	0.32912	0.33120
F Statistic	16.71400	20.65400	220.29000	140.03000	172.43000
F d.f.	(16, 615)	(15, 878)	(16,11606)	(16, 4567)	(16, 5571)
Standard Error	0.38356	0.40883	0.55461	0.51034	0.38007
Observations	632	894	11623	4584	5588

Table III.1.3(1), continued

	OC 25	OC 26	OC 27	OC 28	OC 29
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.17596	-0.23629	-0.16155	-0.28632	-0.32763
	(0.02760)	(0.03878)	(0.05079)	(0.07342)	(0.10044)
LN(HOURS)	0.89442	1.21194	1.15117	1.34644	1.19879
	(0.07213)	(0.09038)	(0.11710)	(0.14346)	(0.24486)
EXPERIENCE	0.51839	0.57629	0.69185	0.74674	0.57785
	(0.02727)	(0.03134)	(0.04915)	(0.05149)	(0.09073)
EXP SQUARED	-0.08720	-0.10135	-0.11261	-0.12328	-0.09455
	(0.00510)	(0.00600)	(0.00978)	(0.01033)	(0.01724)
LN(HRS) * EXP	-0.24462	-0.35608	-0.29407	-0.38999	-0.08925
	(0.03502)	(0.04161)	(0.06061)	(0.07219)	(0.10051)
LN(HRS)*EXP SQRD	0.04444	0.06974	0.04566	0.06867	0.01288
	(0.00664)	(0.00809)	(0.01199)	(0.01461)	(0.01928)
YRS OF SCH (S)	0.02964	0.03229	0.04156	0.02482	0.00547
	(0.00571)	(0.00535)	(0.01122)	(0.00873)	(0.01451)
DUMMY S GE 8	0.10795	0.11408	0.15388	0.09448	-0.17562
	(0.05017)	(0.05341)	(0.10085)	(0.10415)	(0.23182)
D(S GE 8) * S	-0.00601	-0.00783	-0.01637	-0.00101	0.03678
	(0.00674)	(0.00694)	(0.01342)	(0.01304)	(0.02757)
DUMMY S GE 12	-0.08842	0.16566	0.42373	0.31104	1.24624
	(0.05496)	(0.07506)	(0.13842)	(0.18364)	(0.52192)
D(S GE 12) * S	0.01234	-0.00790	-0.02929	-0.01587	-0.09429
	(0.00494)	(0.00664)	(0.01200)	(0.01585)	(0.04453)
DUMMY S GE 16					-0.07149
					(1.69756)
D(S GE 16) * S					0.04605
					(0.10576)
DUMMY S GE 18					
SELF-EMPLOYED	-0.32245		-0.22539		
	(0.01344)		(0.03168)		
GOVERNMENT	-0.07233		-0.13365	-0.04510	0.47430
	(0.00999)		(0.02378)	(0.02300)	(0.07891)
SMSA	0.17666	0.16820	0.24680	0.13438	0.14563
	(0.00663)	(0.00846)	(0.01555)	(0.01938)	(0.04827)
CENTRAL CITY	-0.06617	-0.07048	-0.10626	-0.00189	0.00275
	(0.00712)	(0.00940)	(0.01700)	(0.02115)	(0.09965)
INTERCEPT (1967)	7.87717	7.65354	7.24107	7.35035	7.23637
	(0.05170)	(0.05379)	(0.09700)	(0.09412)	(0.13786)
D(1968)	0.02739	0.04966	0.04904	0.03628	0.02264
	(0.00685)	(0.00876)	(0.01579)	(0.01994)	(0.04284)
D(1969)	0.07556	0.07592	0.07347	0.09241	-0.01131
	(0.00693)	(0.00893)	(0.01635)	(0.02022)	(0.04533)
R Squared	0.22389	0.23544	0.28807	0.32656	0.39327
F Statistic	293.29000	210.92000	107.20000	94.65000	32.30200
F d.f.	(17,17284)	(15,10274)	(17, 4504)	(16, 3123)	(18, 897)
Standard Error	0.36988	0.36676	0.44118	0.45706	0.53877
Observations	17302	10290	4522	3140	916

Table III.1.3(1), concluded

	OC 30
Dependent Var	LN EARNNGS
HOURS	-0.29663 (0.05303)
LN(HOURS)	1.55911 (0.12002)
EXPERIENCE	0.59822 (0.04212)
EXP SQUARED	-0.09339 (0.00736)
LN(HRS) * EXP	-0.31131 (0.05493)
LN(HRS)*EXP SQRD	0.04511 (0.00971)
YRS OF SCH (S)	-0.00066 (0.00955)
DUMMY S GE 8	0.05282 (0.10563)
D(S GE 8) * S	0.00744 (0.01341)
DUMMY S GE 12	0.14442 (0.13220)
D(S GE 12) * S	0.00134 (0.01210)
DUMMY S GE 16	
D(S GE 16) * S	
DUMMY S GE 18	
SELF-EMPLOYED	0.02528 (0.02994)
GOVERNMENT	0.23096 (0.01564)
SMSA	0.19644 (0.01806)
CENTRAL CITY	-0.02180 (0.01729)
INTERCEPT (1967)	7.38023 (0.08277)
D(1968)	0.01000 (0.01735)
D(1969)	0.03138 (0.01773)
R Squared	0.38489
F Statistic F d.f.	147.23000 (17, 4000)
Standard Error	0.45444
Observations	4018

Table III.1.3(2)
Earnings Functions, 1971-74

	OC 01	OC 02	OC 03	OC 04	OC 05
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.13610	-1.20193	-0.39972	-0.03136	-0.94439
	(0.11391)	(0.54454)	(0.19980)	(0.09007)	(0.20536)
LN(HOURS)	0.89217	1.33633	1.65276	0.00393	3.10411
	(0.29079)	(1.31592)	(0.38597)	(0.22027)	(0.48308)
EXPERIENCE	0.50333	-0.87779	0.95301	0.32099	0.66694
	(0.10612)	(0.56433)	(0.21495)	(0.09675)	(0.17958)
EXP SQUARED	-0.06802	0.21740	-0.17698	-0.06422	-0.11216
	(0.02093)	(0.13025)	(0.06260)	(0.01991)	(0.03379)
LN(HRS) * EXP	0.02379	1.72457	-0.57356	0.14861	-0.08486
	(0.12617)	(0.69909)	(0.28290)	(0.12615)	(0.21987)
LN(HRS)*EXP SQRD	-0.03191	-0.37877	0.10676	-0.01779	-0.00203
	(0.02441)	(0.16468)	(0.08216)	(0.02623)	(0.04244)
YRS OF SCH (S)	0.01654	-0.00445	0.03277	0.02134	0.01859
	(0.01324)	(0.17910)	(0.01362)	(0.00732)	(0.03189)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		0.35388			
		(1.75798)			
D(S GE 12) * S		-0.01201			
		(0.19257)			
DUMMY S GE 16	-1.15122	1.71650	-1.23105	-0.92962	-0.73462
	(0.84354)	(2.00643)	(0.80417)	(0.39659)	(2.86529)
D(S GE 16) * S	0.08596	-0.09419	0.08287	0.06492	0.04997
	(0.05274)	(0.13104)	(0.04998)	(0.02479)	(0.17595)
DUMMY S GE 18	0.00447	0.35743	-0.04456	-0.04795	0.01488
	(0.10458)	(0.19480)	(0.09663)	(0.04664)	(0.29419)
SELF-EMPLOYED	-0.11044	-0.14034	-0.12131		0.09998
	(0.04562)	(0.09633)	(0.24316)		(0.06102)
GOVT. ST-LOC	-0.11340	-0.00437	-0.12055	-0.01590	-0.00808
	(0.04846)	(0.14198)	(0.04707)	(0.02488)	(0.08003)
FED	0.06558	0.14791	0.06495	0.12440	0.11501
	(0.05295)	(0.22719)	(0.04534)	(0.03041)	(0.11339)
SMSA	0.08696	0.31440	0.07864	0.10021	0.04179
	(0.03662)	(0.13485)	(0.04265)	(0.01918)	(0.07050)
CENTRAL CITY	-0.01774	0.18581	-0.02323	-0.04425	-0.04542
	(0.02796)	(0.09260)	(0.03050)	(0.01726)	(0.05616)
INTERCEPT (1971)	8.06036	10.13853	8.03205	8.71473	8.32628
	(0.21701)	(1.53850)	(0.27602)	(0.15186)	(0.46867)
D(1972)	0.07297	0.14898	-0.02149	0.03203	-0.03687
	(0.03574)	(0.11184)	(0.03865)	(0.01973)	(0.07072)
D(1973)	0.01640	0.08448	0.02262	0.05226	-0.02033
	(0.03514)	(0.11971)	(0.03810)	(0.01970)	(0.07218)
D(1974)	-0.02837	0.00323	-0.03650	-0.04607	-0.07360
	(0.03579)	(0.11648)	(0.03871)	(0.01979)	(0.07125)
R Squared	0.28769	0.34529	0.40231	0.24045	0.25562
F Statistic	28.85500	3.32250	18.73500	44.89700	13.64100
F d.f.	(18, 1286)	(20, 126)	(18, 501)	(17, 2411)	(18, 715)
Standard Error	0.44984	0.46690	0.30501	0.34541	0.67163
Observations	1305	147	520	2429	734

Table III.1.3(2), continued

	OC 06	OC 07	OC 08	OC 09	OC 10
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-1.07755	0.00207	-0.07402	-0.09725	-0.32984
	(0.24858)	(0.22223)	(0.19191)	(0.09832)	(0.16971)
LN(HOURS)	3.02785	0.32773	0.52349	0.94045	1.25952
	(0.60368)	(0.70409)	(0.47235)	(0.21020)	(0.43007)
EXPERIENCE	0.54555	0.63548	0.60337	0.92226	0.72522
	(0.27953)	(0.27351)	(0.22721)	(0.09131)	(0.17250)
EXP SQUARED	-0.14849	-0.11292	-0.12189	-0.16016	-0.11465
	(0.07320)	(0.05823)	(0.05303)	(0.02086)	(0.03323)
LN(HRS) * EXP	-0.01922	-0.17283	-0.15006	-0.49067	-0.22468
	(0.34335)	(0.34613)	(0.28960)	(0.12140)	(0.21434)
LN(HRS)*EXP SQRD	0.06266	0.03151	0.04771	0.09043	0.00638
	(0.08917)	(0.07486)	(0.06666)	(0.02769)	(0.04196)
YRS OF SCH (S)	-0.03183	-0.07115	0.00671	0.02830	-0.42983
	(0.02600)	(0.10031)	(0.01862)	(0.02014)	(0.19942)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		-1.41415		-0.12813	-5.89178
		(1.01447)		(0.23034)	(1.90441)
D(S GE 12) * S		0.12580		0.00926	0.57721
		(0.10173)		(0.02186)	(0.20556)
DUMMY S GE 16	-0.85521	3.24630	-0.76275	-3.26052	0.31659
	(1.59019)	(1.46229)	(1.04482)	(1.10447)	(1.48190)
D(S GE 16) * S	0.07160	-0.19363	0.06420	0.20068	-0.03144
	(0.09825)	(0.09114)	(0.06503)	(0.06802)	(0.09465)
DUMMY S GE 18	0.02712	0.38123	-0.02221	-0.50416	0.06718
	(0.16602)	(0.17231)	(0.11456)	(0.13976)	(0.14733)
SELF-EMPLOYED	-0.25452				0.08769
	(0.11812)				(0.05570)
GOVT. ST-LOC	-0.15224	-0.05792	-0.14136	-0.10771	-0.29660
	(0.06287)	(0.07462)	(0.05017)	(0.02767)	(0.08596)
FED	0.09352	0.16894	-0.01673	0.13908	-0.18562
	(0.09694)	(0.05866)	(0.06241)	(0.03729)	(0.29620)
SMSA	0.20524	0.09799	0.10801	0.10912	0.00374
	(0.09031)	(0.05617)	(0.04639)	(0.02234)	(0.05646)
CENTRAL CITY	-0.17987	-0.08302	-0.13881	-0.06675	0.00831
	(0.05983)	(0.04954)	(0.04524)	(0.02225)	(0.05434)
INTERCEPT (1971)	9.22079	9.19903	8.39749	7.72479	12.42296
	(0.43942)	(1.02786)	(0.33141)	(0.23414)	(1.81841)
D(1972)	0.10197	0.03635	-0.04268	0.01889	0.07747
	(0.07636)	(0.05857)	(0.05227)	(0.02557)	(0.06354)
D(1973)	0.04643	0.06412	0.03977	0.01922	0.02680
	(0.07972)	(0.05670)	(0.05368)	(0.02526)	(0.06325)
D(1974)	0.08125	0.03200	-0.03769	0.01146	-0.07956
	(0.07435)	(0.05527)	(0.05212)	(0.02537)	(0.06376)
R Squared	0.40256	0.39923	0.34615	0.36970	0.28521
F Statistic	10.81800	9.30330	13.14100	49.79600	13.26700
F d.f.	(18, 289)	(19, 266)	(17, 422)	(19, 1613)	(20, 665)
Standard Error	0.45366	0.32486	0.38044	0.36489	0.57957
Observations	308	286	440	1633	686

Table III.1.3(2), continued

	OC 11	OC 12	OC 13	OC 14	OC 15
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.24027	-0.50395	-0.83511	-0.16373	-0.28576
	(0.14428)	(0.15798)	(0.24095)	(0.12751)	(0.09466)
LN(HOURS)	0.78719	1.44760	2.32723	1.13326	1.60327
	(0.48937)	(0.47069)	(0.52699)	(0.26752)	(0.21301)
EXPERIENCE	0.94464	0.38329	0.51593	1.13500	1.20163
	(0.24233)	(0.27745)	(0.25889)	(0.17049)	(0.10144)
EXP SQUARED	-0.16200	-0.08632	-0.05173	-0.20004	-0.21208
	(0.04433)	(0.05305)	(0.06165)	(0.04679)	(0.02281)
LN(HRS) * EXP	-0.10554	0.09706	0.08277	-0.61641	-0.66331
	(0.22351)	(0.25287)	(0.33223)	(0.23279)	(0.12002)
LN(HRS)*EXP SQRD	0.00242	-0.02712	-0.07797	0.10399	0.11652
	(0.04374)	(0.04803)	(0.08098)	(0.06372)	(0.02664)
YRS OF SCH (S)	-0.00820	0.04290	0.10482	-0.04400	0.00368
	(0.05746)	(0.07204)	(0.11622)	(0.04951)	(0.02353)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		-0.09545	0.67156	-0.25221	
		(0.95287)	(1.20277)	(0.58110)	
D(S GE 12) * S		-0.02166	-0.06889	0.04949	
		(0.08932)	(0.11895)	(0.05423)	
DUMMY S GE 16		0.52548	2.92081	-2.28074	1.94568
		(2.48586)	(2.63464)	(1.18804)	(1.59887)
D(S GE 16) * S		-0.03614	-0.18298	0.15148	-0.10616
		(0.15511)	(0.16375)	(0.07393)	(0.09795)
DUMMY S GE 18	0.49428	0.06357	0.22499	-0.17582	0.28991
	(0.28825)	(0.25877)	(0.30724)	(0.12776)	(0.14743)
SELF-EMPLOYED	0.09312	-0.03659	0.12851		
	(0.06359)	(0.16343)	(0.19856)		
GOVT. ST-LOC	-0.08408		-0.03363	-0.25172	0.00788
	(0.07832)		(0.07303)	(0.04283)	(0.03323)
FED	-0.16668			0.05609	
	(0.27130)			(0.06531)	
SMSA	0.10360	0.09590	0.26660	0.19060	0.11160
	(0.07358)	(0.06337)	(0.07489)	(0.04811)	(0.03901)
CENTRAL CITY	-0.00317	0.02475	-0.11857	-0.19055	-0.03289
	(0.05928)	(0.07479)	(0.08086)	(0.04370)	(0.03580)
INTERCEPT (1971)	8.60305	8.16523	7.18473	8.35789	7.84305
	(0.87939)	(0.70545)	(1.20620)	(0.52415)	(0.32368)
D(1972)	0.06423	-0.02193	0.06858	0.01119	-0.04545
	(0.07285)	(0.07881)	(0.09051)	(0.05379)	(0.04390)
D(1973)	0.03695	0.12151	0.21127	-0.05331	-0.03802
	(0.07478)	(0.07914)	(0.08934)	(0.05292)	(0.04418)
D(1974)	-0.04880	0.00652	0.15863	-0.07721	-0.07176
	(0.07544)	(0.07891)	(0.08805)	(0.05277)	(0.04310)
R Squared	0.19705	0.16258	0.39507	0.39237	0.46556
F Statistic	8.95710	5.22020	6.49650	24.23200	37.94700
F d.f.	(16, 584)	(18, 484)	(19, 189)	(19, 713)	(16, 697)
Standard Error	0.64246	0.61362	0.44660	0.49514	0.40115
Observations	601	503	209	733	714

Table III.1.3(2), continued

	OC 16	OC 17	OC 18	OC 19	OC 20
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.12577	-0.61614	-0.27861	-0.43984	0.05681
	(0.08794)	(0.12090)	(0.14054)	(0.15868)	(0.14329)
LN(HOURS)	0.53629	1.60085	1.32048	1.52600	0.34620
	(0.20825)	(0.26986)	(0.37528)	(0.45659)	(0.38150)
EXPERIENCE	0.51100	0.45242	0.66724	0.43733	0.62608
	(0.08369)	(0.11283)	(0.14212)	(0.13404)	(0.20874)
EXP SQUARED	-0.08580	-0.06640	-0.11729	-0.03762	-0.11344
	(0.01987)	(0.02237)	(0.02672)	(0.02154)	(0.04313)
LN(HRS) * EXP	-0.14610	0.16369	-0.35291	0.16108	-0.26871
	(0.10300)	(0.14093)	(0.18218)	(0.17612)	(0.24842)
LN(HRS)*EXP SQRD	0.01882	-0.03985	0.06992	-0.06309	0.05439
	(0.02516)	(0.02747)	(0.03494)	(0.02971)	(0.05165)
YRS OF SCH (S)	-0.01700	0.03222	-0.07157	-0.01985	0.08140
	(0.01129)	(0.02597)	(0.02529)	(0.05496)	(0.07941)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		0.44033	-1.16559	-0.84255	1.22543
		(0.35571)	(0.32224)	(0.58873)	(0.82115)
D(S GE 12) * S		-0.02291	0.11286	0.06847	-0.11129
		(0.03202)	(0.02963)	(0.05756)	(0.08571)
DUMMY S GE 16	-2.54992	0.63645	-0.98607	-1.44561	0.04932
	(0.39388)	(1.33258)	(1.11645)	(1.13514)	(1.09329)
D(S GE 16) * S	0.16689	-0.03049	0.06685	0.09628	0.01875
	(0.02491)	(0.08307)	(0.06957)	(0.07106)	(0.06880)
DUMMY S GE 18	-0.10044	0.11809	-0.05278	-0.13778	0.15098
	(0.03742)	(0.16008)	(0.13052)	(0.14008)	(0.08940)
SELF-EMPLOYED		-0.24455			
		(0.04789)			
GOVT. ST-LOC	0.17780	-0.08200	-0.29180		0.08253
	(0.02563)	(0.07589)	(0.02830)		(0.03675)
FED		0.06475			
		(0.08938)			
SMSA	0.16385	0.20711	0.19473	0.13817	0.19929
	(0.01865)	(0.04845)	(0.03203)	(0.03702)	(0.03274)
CENTRAL CITY	-0.09192	-0.11780	-0.03581	-0.00441	-0.05412
	(0.02059)	(0.03689)	(0.03391)	(0.03607)	(0.03894)
INTERCEPT (1971)	8.58466	8.15557	9.10812	8.58948	7.41707
	(0.17372)	(0.29487)	(0.31805)	(0.56863)	(0.73649)
D(1972)	0.00360	0.00219	0.05139	0.07957	-0.01557
	(0.02260)	(0.04666)	(0.03635)	(0.04264)	(0.04247)
D(1973)	-0.00103	-0.00354	0.05910	0.05946	0.00856
	(0.02272)	(0.04709)	(0.03693)	(0.04172)	(0.04087)
D(1974)	-0.06704	-0.09266	0.01672	0.02108	-0.02196
	(0.02274)	(0.04668)	(0.03648)	(0.04320)	(0.04098)
R Squared	0.31186	0.31608	0.40255	0.30605	0.27456
F Statistic	53.19300	23.68600	31.51900	22.07700	13.64600
F d.f.	(16, 1878)	(20, 1025)	(18, 842)	(17, 851)	(18, 649)
Standard Error	0.34531	0.53211	0.38032	0.43272	0.36824
Observations	1895	1046	861	869	668

Table III.1.3(2), continued

	OC 21	OC 22	OC 23	OC 24	OC 25
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.23277	-0.25552	-0.21878	-0.45740	-0.18558
	(0.07546)	(0.04105)	(0.06126)	(0.05821)	(0.02874)
LN(HOURS)	1.25058	1.05294	1.39844	1.73660	0.93661
	(0.21063)	(0.12567)	(0.12997)	(0.11640)	(0.06908)
EXPERIENCE	0.89281	0.65014	0.90852	0.66216	0.64478
	(0.07615)	(0.05244)	(0.05246)	(0.04098)	(0.02531)
EXP SQUARED	-0.15860	-0.10247	-0.15865	-0.12111	-0.11442
	(0.01474)	(0.00928)	(0.01023)	(0.00806)	(0.00485)
LN(HRS) * EXP	-0.44855	-0.18787	-0.45079	-0.27426	-0.28515
	(0.07930)	(0.05882)	(0.06590)	(0.05591)	(0.03334)
LN(HRS)*EXP SQRD	0.08548	0.02553	0.07525	0.05858	0.05616
	(0.01441)	(0.01046)	(0.01287)	(0.01116)	(0.00650)
YRS OF SCH (S)	0.00916	0.01943	-0.00821	0.02494	0.02480
	(0.01301)	(0.00756)	(0.01059)	(0.00685)	(0.00639)
DUMMY S GE 8					0.18058
					(0.05642)
D(S GE 8) * S					-0.01618
					(0.00758)
DUMMY S GE 12	-0.60116	-0.18644	-0.36589	-0.04641	-0.15463
	(0.18553)	(0.10926)	(0.14524)	(0.10037)	(0.06780)
D(S GE 12) * S	0.05633	0.02322	0.04298	0.00812	0.02095
	(0.01666)	(0.00986)	(0.01306)	(0.00899)	(0.00601)
DUMMY S GE 16	1.26803	-0.10370	-0.22522	-1.89143	-0.38638
	(0.98839)	(0.52154)	(0.68689)	(0.84203)	(0.37192)
D(S GE 16) * S	-0.07394	0.01508	0.02406	0.11919	0.02329
	(0.06159)	(0.03247)	(0.04277)	(0.05231)	(0.02280)
DUMMY S GE 18	0.10664	-0.06056	-0.08617	-0.28838	
	(0.12700)	(0.06423)	(0.08892)	(0.10798)	
SELF-EMPLOYED	-0.23280	-0.28373	-0.04034		-0.27963
	(0.03362)	(0.01388)	(0.02331)		(0.01118)
GOVT. ST-LOC				-0.06332	-0.09186
				(0.01889)	(0.01172)
FED				0.14359	
				(0.01397)	
SMSA	0.13207	0.22127	0.20865	0.11271	0.17617
	(0.02506)	(0.01331)	(0.01834)	(0.01357)	(0.00662)
CENTRAL CITY	-0.06280	-0.10883	-0.08694	-0.05988	-0.07875
	(0.02214)	(0.01352)	(0.01691)	(0.01220)	(0.00730)
INTERCEPT (1971)	7.96093	8.05775	7.79355	7.82320	7.92624
	(0.16332)	(0.10138)	(0.12857)	(0.09115)	(0.05303)
D(1972)	-0.00779	0.04604	0.02261	0.02405	0.02376
	(0.02636)	(0.01540)	(0.01993)	(0.01445)	(0.00791)
D(1973)	0.01384	0.06895	0.02539	0.02487	0.05182
	(0.02666)	(0.01543)	(0.02003)	(0.01472)	(0.00795)
D(1974)	-0.02683	0.01566	-0.01177	0.00597	0.02985
	(0.02695)	(0.01569)	(0.02053)	(0.01502)	(0.00822)
R Squared	0.26066	0.21898	0.30319	0.35774	0.22998
F Statistic	50.37600	165.30000	147.67000	176.45000	310.97000
F d.f.	(18, 2572)	(18,10612)	(18, 6109)	(19, 6019)	(20,20823)
Standard Error	0.48076	0.56313	0.55926	0.40873	0.41011
Observations	2591	10631	6128	6039	20844

Table III.1.3(2), concluded

	OC 26	OC 27	OC 28	OC 29	OC 30
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.28577	-0.20252	-0.32315	-0.44331	-0.32750
	(0.04051)	(0.04871)	(0.06472)	(0.09453)	(0.04338)
LN(HOURS)	1.37822	1.09488	1.47250	1.35367	1.58503
	(0.08655)	(0.11383)	(0.12182)	(0.22099)	(0.09228)
EXPERIENCE	0.72853	0.72190	0.76759	0.48856	0.71937
	(0.03202)	(0.04779)	(0.04439)	(0.07774)	(0.03867)
EXP SQUARED	-0.12490	-0.13402	-0.12765	-0.08033	-0.12212
	(0.00647)	(0.00918)	(0.00929)	(0.01455)	(0.00737)
LN(HRS) * EXP	-0.38876	-0.33214	-0.37431	-0.00415	-0.30303
	(0.04290)	(0.06058)	(0.06266)	(0.08989)	(0.05120)
LN(HRS)*EXP SQRD	0.06849	0.06749	0.06475	0.01133	0.04803
	(0.00874)	(0.01180)	(0.01317)	(0.01733)	(0.00984)
YRS OF SCH (S)	0.02992	0.01682	0.01336	0.00588	-0.00443
	(0.00574)	(0.01213)	(0.00932)	(0.01377)	(0.00996)
DUMMY S GE 8	0.21048	0.17195	-0.00554	-0.31781	0.17541
	(0.06120)	(0.10984)	(0.10365)	(0.22275)	(0.09969)
D(S GE 8) * S	-0.01911	-0.00719	0.00861	0.03729	-0.00614
	(0.00779)	(0.01457)	(0.01303)	(0.02587)	(0.01311)
DUMMY S GE 12	0.10148	0.21797	0.18632	-0.45975	-0.53200
	(0.10237)	(0.13060)	(0.16076)	(0.40609)	(0.12760)
D(S GE 12) * S	0.00259	-0.01275	-0.00475	0.05018	0.05863
	(0.00888)	(0.01160)	(0.01388)	(0.03515)	(0.01131)
DUMMY S GE 16	-0.39627		-1.25647	0.78015	0.61204
	(0.62322)		(1.10141)	(1.27613)	(0.57370)
D(S GE 16) * S	0.02405		0.06472	-0.03825	-0.03728
	(0.03807)		(0.06761)	(0.07957)	(0.03499)
DUMMY S GE 18					
SELF-EMPLOYED		-0.10154			-0.09879
		(0.02647)			(0.02754)
GOVT. ST-LOC		-0.19781	-0.05092	0.35722	0.24271
		(0.02374)	(0.02210)	(0.07849)	(0.01319)
FED					
SMSA	0.12293	0.16566	0.19413	0.13166	0.18792
	(0.00915)	(0.01443)	(0.01686)	(0.03826)	(0.01520)
CENTRAL CITY	-0.05785	-0.06573	-0.02199	-0.05947	-0.02676
	(0.01030)	(0.01609)	(0.01838)	(0.07364)	(0.01434)
INTERCEPT (1971)	7.61677	7.73252	7.48669	7.41964	7.45258
	(0.05540)	(0.09970)	(0.08829)	(0.12857)	(0.07552)
D(1972)	0.03448	0.05557	0.06411	0.14740	0.02747
	(0.01094)	(0.01716)	(0.02046)	(0.04507)	(0.01705)
D(1973)	0.05254	0.08145	0.06616	0.12500	0.04931
	(0.01111)	(0.01735)	(0.01998)	(0.04381)	(0.01692)
D(1974)	0.03960	0.03342	0.01801	0.10024	0.00626
	(0.01151)	(0.01775)	(0.02061)	(0.04548)	(0.01708)
R Squared	0.27897	0.24957	0.37336	0.40369	0.45926
F Statistic	225.71000	95.18800	136.63000	41.15400	242.09000
F d.f.	(18, 10501)	(18, 5152)	(19, 4357)	(19, 1155)	(20, 5701)
Standard Error	0.40638	0.44584	0.47479	0.54079	0.45663
Observations	10520	5171	4377	1175	5722

Table III.1.3(3)
Earnings Functions, 1975-78

	OC 01	OC 02	OC 03	OC 04	OC 05
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.85393	-1.27127	-0.82742	-0.46062	-1.01507
	(0.18111)	(0.85321)	(0.21113)	(0.08260)	(0.16874)
LN(HOURS)	2.66052	4.04948	2.53713	1.81119	3.57979
	(0.37968)	(2.15982)	(0.39881)	(0.20630)	(0.39857)
EXPERIENCE	0.46806	0.31154	0.40222	0.58747	0.89330
	(0.11649)	(0.74096)	(0.25376)	(0.08489)	(0.17874)
EXP SQUARED	-0.06874	0.02446	0.04605	-0.10658	-0.12925
	(0.02180)	(0.16435)	(0.08087)	(0.01787)	(0.03396)
LN(HRS) * EXP	0.04384	0.30876	0.30381	-0.20836	-0.46234
	(0.14931)	(0.95607)	(0.33936)	(0.10610)	(0.20890)
LN(HRS)*EXP SQRD	-0.02180	-0.15273	-0.23103	0.04372	0.05930
	(0.02822)	(0.21156)	(0.10841)	(0.02221)	(0.04024)
YRS OF SCH (S)	-0.00137	0.06707	0.04996	0.02783	0.00524
	(0.01272)	(0.06587)	(0.01267)	(0.00638)	(0.03607)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12					
D(S GE 12) * S					
DUMMY S GE 16	-1.40254	1.38876	-0.62606	-0.31073	
	(0.61930)	(1.91895)	(0.70126)	(0.31868)	
D(S GE 16) * S	0.10412	-0.07551	0.04150	0.02662	
	(0.03889)	(0.12126)	(0.04375)	(0.01998)	
DUMMY S GE 18	-0.07915	-0.00192	-0.08294	0.03086	0.21599
	(0.07568)	(0.18495)	(0.08104)	(0.03743)	(0.11733)
SELF-EMPLOYED	0.15485	0.03720			-0.02646
	(0.03204)	(0.09932)			(0.04340)
GOVT. ST-LOC	-0.08624	0.00391	-0.09834	-0.11688	-0.09983
	(0.03688)	(0.15344)	(0.03748)	(0.02138)	(0.05731)
FED	0.05179	0.27605	0.07848	0.02205	0.10944
	(0.04174)	(0.17837)	(0.03866)	(0.01980)	(0.07678)
SMSA	0.11500	0.03011	0.00592	0.06501	0.16040
	(0.02519)	(0.10068)	(0.02828)	(0.01322)	(0.04292)
CENTRAL CITY	-0.05107	-0.18258	-0.07224	-0.07030	-0.06855
	(0.02610)	(0.08939)	(0.02729)	(0.01451)	(0.04248)
INTERCEPT (1975)	8.47457	7.34289	8.03994	8.18832	8.24573
	(0.24041)	(1.20625)	(0.29004)	(0.12607)	(0.60883)
D(1976)	0.01659	0.00413	-0.03299	0.02127	0.06337
	(0.03022)	(0.11582)	(0.03242)	(0.01601)	(0.05238)
D(1977)	0.00992	-0.04618	-0.02973	0.00792	-0.02852
	(0.03010)	(0.11618)	(0.03184)	(0.01612)	(0.05117)
D(1978)	0.05883	0.00102	-0.03910	0.01752	-0.00008
	(0.02959)	(0.10421)	(0.03080)	(0.01603)	(0.05151)
R Squared	0.39784	0.35893	0.48151	0.34255	0.26739
F Statistic	53.25900	5.03900	38.40400	91.51600	21.83100
F d.f.	(18, 1451)	(18, 162)	(17, 703)	(17, 2986)	(16, 957)
Standard Error	0.39690	0.48353	0.29184	0.30165	0.54052
Observations	1470	181	721	3004	974

Table III.1.3(3), continued

	OC 06	OC 07	OC 08	OC 09	OC 10
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.89583	-1.11975	-0.93058	-0.52541	-0.86555
	(0.21298)	(0.50813)	(0.24786)	(0.13283)	(0.16188)
LN(HOURS)	3.25135	3.37789	2.51901	2.46673	2.65450
	(0.41001)	(0.97265)	(0.46707)	(0.24971)	(0.38410)
EXPERIENCE	0.22564	0.73795	0.62319	0.97577	0.79311
	(0.22474)	(0.41856)	(0.24070)	(0.12399)	(0.13599)
EXP SQUARED	0.07163	-0.09071	-0.10435	-0.18934	-0.12644
	(0.05138)	(0.10642)	(0.05930)	(0.03117)	(0.02671)
LN(HRS) * EXP	0.35738	-0.45774	0.09813	-0.66925	-0.50848
	(0.30311)	(0.56037)	(0.30933)	(0.16596)	(0.17075)
LN(HRS)*EXP SQRD	-0.20585	0.03453	-0.03058	0.14098	0.07346
	(0.07012)	(0.14426)	(0.07642)	(0.04205)	(0.03377)
YRS OF SCH (S)	0.06207	0.03064	0.06648	0.01582	0.07218
	(0.04036)	(0.02461)	(0.02110)	(0.02513)	(0.02731)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12				-0.09507	
				(0.27184)	
D(S GE 12) * S				0.01280	
				(0.02596)	
DUMMY S GE 16	0.26895	-1.10574	-0.04336	-0.09635	-2.27453
	(1.22431)	(1.30179)	(1.01519)	(0.85169)	(1.09328)
D(S GE 16) * S	-0.01101	0.07610	0.00439	0.00339	0.15300
	(0.07778)	(0.08141)	(0.06364)	(0.05253)	(0.06841)
DUMMY S GE 18	0.04000	-0.00364	-0.08593	0.01781	-0.16280
	(0.11795)	(0.14657)	(0.11225)	(0.10366)	(0.10988)
SELF-EMPLOYED	0.08883			-0.04913	0.28885
	(0.07687)			(0.05845)	(0.04330)
GOVT. ST-LOC	-0.11445	-0.21552	-0.17573	-0.13786	-0.14710
	(0.04509)	(0.08892)	(0.04340)	(0.02453)	(0.06123)
FED	0.15349	-0.00282	0.07469	0.06848	
	(0.06029)	(0.05596)	(0.04502)	(0.02367)	
SMSA	0.20029	-0.00278	0.05218	0.06190	0.09775
	(0.04757)	(0.05696)	(0.03743)	(0.01637)	(0.03969)
CENTRAL CITY	-0.06542	-0.05203	-0.11326	-0.05431	-0.04380
	(0.04482)	(0.05241)	(0.04534)	(0.02005)	(0.04468)
INTERCEPT (1975)	7.25095	8.38322	7.86374	7.69354	7.46434
	(0.60453)	(0.56475)	(0.36480)	(0.28854)	(0.41648)
D(1976)	-0.05822	0.02743	-0.05043	0.03223	-0.00557
	(0.05345)	(0.05976)	(0.04486)	(0.02129)	(0.05011)
D(1977)	0.03071	0.06131	-0.04679	0.04890	0.06102
	(0.05519)	(0.06007)	(0.04742)	(0.02079)	(0.04994)
D(1978)	-0.01423	-0.07596	-0.00549	0.02863	-0.04181
	(0.05538)	(0.05917)	(0.04617)	(0.02099)	(0.05004)
R Squared	0.51548	0.30688	0.53292	0.42722	0.41459
F Statistic	25.35700	7.60480	35.57100	68.88000	35.45200
F d.f.	(18, 429)	(17, 292)	(17, 530)	(20, 1847)	(17, 851)
Standard Error	0.38376	0.36026	0.37918	0.31102	0.49622
Observations	448	310	548	1868	869

Table III.1.3(3), continued

	OC 11	OC 12	OC 13	OC 14	OC 15
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.49473	-0.67239	-0.91091	-0.83310	-0.35627
	(0.10835)	(0.14291)	(0.16380)	(0.10924)	(0.09310)
LN(HOURS)	0.77904	2.10125	2.93438	2.48802	1.74793
	(0.38386)	(0.37810)	(0.41739)	(0.22425)	(0.18642)
EXPERIENCE	-0.13434	0.19686	0.56068	0.89341	0.92193
	(0.16560)	(0.21109)	(0.26715)	(0.10730)	(0.10873)
EXP SQUARED	0.03605	-0.05151	-0.14898	-0.14126	-0.15857
	(0.03039)	(0.03999)	(0.08962)	(0.02507)	(0.02819)
LN(HRS) * EXP	0.80754	-0.01780	-0.22286	-0.36771	-0.42396
	(0.15329)	(0.21093)	(0.33017)	(0.13629)	(0.13328)
LN(HRS)*EXP SQRD	-0.16620	0.01487	0.11353	0.04171	0.08156
	(0.02939)	(0.04023)	(0.11689)	(0.03085)	(0.03327)
YRS OF SCH (S)		-0.02713	-0.05827	0.03805	0.01441
		(0.05139)	(0.04512)	(0.01536)	(0.04645)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		1.05426	-0.93383		
		(0.72393)	(0.57214)		
D(S GE 12) * S		-0.07703	0.10455		
		(0.06498)	(0.05119)		
DUMMY S GE 16		-1.70169	-2.69092	-0.52458	0.04447
		(1.77532)	(1.82699)	(0.83332)	(1.79596)
D(S GE 16) * S		0.12510	0.16985	0.03465	0.00788
		(0.11063)	(0.11346)	(0.05181)	(0.10983)
DUMMY S GE 18		0.01863	-0.28645	0.01195	0.10452
		(0.17863)	(0.21351)	(0.08971)	(0.12887)
SELF-EMPLOYED	0.14905	-0.02807			
	(0.03898)	(0.08846)			
GOVT. ST-LOC	-0.08853	0.60846	0.03779	-0.15805	0.05703
	(0.05483)	(0.20480)	(0.05183)	(0.03114)	(0.03011)
FED		0.65195	-0.10661	0.24924	-0.23736
		(0.32805)	(0.08728)	(0.04540)	(0.11907)
SMSA	0.07305	0.08892	-0.01689	0.16884	0.14417
	(0.03903)	(0.05131)	(0.05425)	(0.03214)	(0.03049)
CENTRAL CITY	0.01518	0.06977	-0.04637	-0.14182	0.00175
	(0.03902)	(0.06501)	(0.05367)	(0.03598)	(0.03630)
INTERCEPT (1975)	9.95281	8.55348	8.70128	7.96932	7.54261
	(0.19228)	(0.53568)	(0.49422)	(0.24494)	(0.66782)
D(1976)	0.04325	0.13701	-0.03455	0.02406	0.07319
	(0.04620)	(0.06538)	(0.06695)	(0.04059)	(0.03839)
D(1977)	-0.03105	0.11797	0.04123	-0.01123	0.03318
	(0.04607)	(0.06670)	(0.06237)	(0.03956)	(0.03964)
D(1978)	-0.04279	0.11038	0.06762	-0.02442	0.03624
	(0.04645)	(0.06442)	(0.06551)	(0.03962)	(0.03751)
R Squared	0.33722	0.14190	0.41558	0.45502	0.55340
F Statistic	30.52700	5.39940	10.62900	52.64900	63.34200
F d.f.	(13, 780)	(20, 653)	(19, 284)	(17, 1072)	(17, 869)
Standard Error	0.44576	0.56294	0.36545	0.44618	0.38487
Observations	794	674	304	1090	887

Table III.1.3(3), continued

	OC 16	OC 17	OC 18	OC 19	OC 20
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.68944	-0.33945	-1.31068	0.04028	-0.63385
	(0.08253)	(0.10377)	(0.18682)	(0.19159)	(0.20732)
LN(HOURS)	2.18971	1.61728	3.51770	0.39119	2.05615
	(0.18951)	(0.21789)	(0.43393)	(0.49765)	(0.46210)
EXPERIENCE	0.79269	0.76916	0.16958	0.42005	0.53786
	(0.08310)	(0.10256)	(0.10786)	(0.14807)	(0.21889)
EXP SQUARED	-0.18736	-0.10932	0.00592	-0.04102	-0.09398
	(0.02032)	(0.02201)	(0.01591)	(0.02707)	(0.04782)
LN(HRS) * EXP	-0.44860	-0.30153	0.39393	0.18093	-0.09838
	(0.10510)	(0.13742)	(0.14163)	(0.19032)	(0.25416)
LN(HRS)*EXP SQRD	0.12748	0.03253	-0.10710	-0.06367	0.01956
	(0.02633)	(0.02976)	(0.02137)	(0.03581)	(0.05484)
YRS OF SCH (S)	0.00097	0.07818	0.00727	0.00375	-0.01389
	(0.01244)	(0.03536)	(0.02075)	(0.01331)	(0.01769)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		1.11954	-0.34668		
		(0.40665)	(0.25575)		
D(S GE 12) * S		-0.08426	0.03630		
		(0.03852)	(0.02406)		
DUMMY S GE 16	-0.98239	-1.12297	0.32464	-0.36237	-0.30110
	(0.33861)	(0.99192)	(0.78548)	(0.83499)	(0.92159)
D(S GE 16) * S	0.06463	0.08060	-0.01222	0.04097	0.02633
	(0.02177)	(0.06187)	(0.04889)	(0.05221)	(0.05687)
DUMMY S GE 18	0.01912	-0.06581	0.15528	0.09729	0.13094
	(0.03028)	(0.11709)	(0.09082)	(0.10142)	(0.08389)
SELF-EMPLOYED	-0.42605	-0.24947			
	(0.07890)	(0.03475)			
GOVT. ST-LOC	0.15717	-0.15275	-0.26386		-0.00886
	(0.02098)	(0.06519)	(0.02275)		(0.03023)
FED	0.19424	0.08094			
	(0.07475)	(0.07044)			
SMSA	0.17802	0.18942	0.13336	0.14147	0.19180
	(0.01439)	(0.03528)	(0.02552)	(0.02737)	(0.02869)
CENTRAL CITY	-0.07357	-0.07568	0.00610	-0.07987	-0.06580
	(0.01826)	(0.03389)	(0.02974)	(0.03295)	(0.03800)
INTERCEPT (1975)	8.25380	6.92626	8.68476	8.17388	8.72021
	(0.18877)	(0.37318)	(0.28073)	(0.25973)	(0.35512)
D(1976)	0.06034	0.05146	0.01092	-0.01766	0.02795
	(0.01822)	(0.04070)	(0.03152)	(0.03511)	(0.03681)
D(1977)	0.06610	0.06860	0.05683	0.02276	0.05759
	(0.01827)	(0.04088)	(0.03179)	(0.03505)	(0.03781)
D(1978)	0.01398	0.02199	0.02609	0.07195	-0.00654
	(0.01832)	(0.04005)	(0.03212)	(0.03560)	(0.03754)
R Squared	0.41213	0.36737	0.48595	0.39204	0.28192
F Statistic	88.72200	40.88100	59.34700	42.90400	21.07800
F d.f.	(18, 2278)	(20, 1408)	(18, 1130)	(15, 998)	(16, 859)
Standard Error	0.30104	0.52902	0.35890	0.38251	0.38043
Observations	2297	1429	1149	1014	876

Table III.1.3(3), continued

	OC 21	OC 22	OC 23	OC 24	OC 25
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.49718 (0.09256)	-0.71940 (0.04587)	-0.76237 (0.06416)	-0.77915 (0.06696)	-0.56315 (0.03479)
LN(HOURS)	1.83878 (0.23168)	2.44066 (0.12581)	2.54619 (0.13011)	2.52369 (0.11695)	2.24910 (0.07731)
EXPERIENCE	0.59587 (0.09086)	0.64643 (0.04792)	0.54898 (0.04639)	0.35147 (0.04581)	0.69381 (0.02740)
EXP SQUARED	-0.08461 (0.01842)	-0.08877 (0.00855)	-0.08750 (0.00871)	-0.05950 (0.00882)	-0.11439 (0.00533)
LN(HRS) * EXP	-0.10759 (0.10408)	-0.19748 (0.05476)	-0.08889 (0.05959)	0.12846 (0.06252)	-0.34894 (0.03618)
LN(HRS)*EXP SQRD	0.00440 (0.02090)	0.01553 (0.00980)	0.00791 (0.01134)	-0.02064 (0.01216)	0.06042 (0.00712)
YRS OF SCH (S)	0.00784 (0.01373)	0.02771 (0.00684)	0.02201 (0.01188)	0.01634 (0.00661)	0.03482 (0.00588)
DUMMY S GE 8					0.07714 (0.05438)
D(S GE 8) * S					-0.00540 (0.00719)
DUMMY S GE 12	-0.32265 (0.18340)	-0.17485 (0.09656)	0.01399 (0.14677)	-0.05847 (0.08985)	-0.04056 (0.06039)
D(S GE 12) * S	0.04061 (0.01677)	0.02477 (0.00876)	0.01577 (0.01359)	0.01393 (0.00816)	0.01268 (0.00544)
DUMMY S GE 16	0.19945 (0.81541)	-0.09701 (0.44031)	0.83000 (0.28830)	0.35499 (0.27143)	0.40312 (0.32087)
D(S GE 16) * S	-0.00290 (0.05078)	0.01385 (0.02744)	-0.03941 (0.01805)	-0.01588 (0.01678)	-0.02677 (0.01972)
DUMMY S GE 18	0.00354 (0.10361)	-0.01491 (0.05377)			
SELF-EMPLOYED	-0.27454 (0.02695)	-0.11852 (0.01044)	0.04006 (0.01763)		-0.31567 (0.00918)
GOVT. ST-LOC				-0.08045 (0.01708)	-0.13046 (0.01132)
FED	-0.04001 (0.09478)			0.12822 (0.01193)	
SMSA	0.14108 (0.02091)	0.17163 (0.01086)	0.18590 (0.01509)	0.09565 (0.01104)	0.13643 (0.00594)
CENTRAL CITY	-0.10535 (0.02286)	-0.06037 (0.01288)	-0.06421 (0.01661)	-0.06504 (0.01151)	-0.07086 (0.00741)
INTERCEPT (1975)	7.94136 (0.16874)	7.80740 (0.08959)	7.70172 (0.13742)	8.00136 (0.09512)	7.60338 (0.05138)
D(1976)	0.03957 (0.02556)	0.01471 (0.01396)	0.02064 (0.01874)	-0.00371 (0.01325)	0.02662 (0.00771)
D(1977)	0.03945 (0.02610)	0.03137 (0.01388)	0.06255 (0.01877)	0.00726 (0.01347)	0.03427 (0.00773)
D(1978)	0.00643 (0.02594)	0.04729 (0.01393)	0.02612 (0.01876)	0.00637 (0.01337)	0.04519 (0.00767)
R Squared	0.30768	0.22550	0.36422	0.48658	0.30125
F Statistic	67.10700	218.61000	235.52000	350.93000	538.87000
F d.f.	(19, 2869)	(18,13515)	(17, 6989)	(18, 6665)	(20,24998)
Standard Error	0.47727	0.55176	0.53993	0.37759	0.41609
Observations	2889	13534	7007	6684	25019

Table III.1.3(3), concluded

	OC 26	OC 27	OC 28	OC 29	OC 30
Dependent Var	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS	LN EARNNGS
HOURS	-0.77797	-0.54763	-0.66535	-0.60092	-0.69164
	(0.04955)	(0.04930)	(0.06402)	(0.07962)	(0.04066)
LN(HOURS)	2.75117	2.15091	2.23287	1.80459	2.32650
	(0.10099)	(0.11330)	(0.11180)	(0.18572)	(0.07868)
EXPERIENCE	0.53690	0.57543	0.42184	0.30140	0.34870
	(0.03861)	(0.04491)	(0.04390)	(0.07629)	(0.03262)
EXP SQUARED	-0.08370	-0.09778	-0.06831	-0.05192	-0.05375
	(0.00789)	(0.00855)	(0.00845)	(0.01468)	(0.00599)
LN(HRS) * EXP	-0.18708	-0.18055	0.00056	0.15480	0.04773
	(0.05129)	(0.05598)	(0.06171)	(0.08221)	(0.04271)
LN(HRS)*EXP SQRD	0.02860	0.03112	0.00048	-0.02194	-0.01340
	(0.01054)	(0.01085)	(0.01200)	(0.01606)	(0.00785)
YRS OF SCH (S)	0.03258	0.04208	0.01553	-0.00903	0.00692
	(0.00545)	(0.01078)	(0.00795)	(0.01065)	(0.00819)
DUMMY S GE 8	0.11996	0.18318	0.20376	-0.10645	0.01183
	(0.06001)	(0.10020)	(0.09275)	(0.18458)	(0.08729)
D(S GE 8) * S	-0.00861	-0.01863	-0.01011	0.02324	0.00758
	(0.00754)	(0.01321)	(0.01146)	(0.02099)	(0.01112)
DUMMY S GE 12	0.17223	0.14910	0.01312	-0.04130	-0.35997
	(0.07626)	(0.11074)	(0.11541)	(0.31559)	(0.10393)
D(S GE 12) * S	-0.00215	-0.00899	0.01570	0.01910	0.03876
	(0.00685)	(0.01000)	(0.01032)	(0.02738)	(0.00927)
DUMMY S GE 16				-0.41749	0.95045
				(0.83834)	(0.39927)
D(S GE 16) * S				0.04288	-0.05558
				(0.05245)	(0.02434)
DUMMY S GE 18					
SELF-EMPLOYED		-0.14389	-0.12321	0.17247	-0.19511
		(0.02154)	(0.03006)	(0.06110)	(0.02413)
GOVT. ST-LOC		-0.22252	-0.09396		0.22288
		(0.02160)	(0.01918)		(0.01137)
FED				0.54141	
				(0.06176)	
SMSA	0.10586	0.15076	0.16190	0.19510	0.13610
	(0.00843)	(0.01263)	(0.01397)	(0.03184)	(0.01202)
CENTRAL CITY	-0.05707	-0.08519	-0.09932	-0.07053	-0.04218
	(0.01014)	(0.01518)	(0.01652)	(0.06564)	(0.01284)
INTERCEPT (1975)	7.61311	7.56184	7.72869	7.66036	7.70659
	(0.05778)	(0.08741)	(0.08026)	(0.10066)	(0.06270)
D(1976)	0.02628	0.03417	0.05053	0.05436	0.02207
	(0.01073)	(0.01613)	(0.01771)	(0.03626)	(0.01465)
D(1977)	0.04781	0.06339	0.06292	0.09106	0.03179
	(0.01077)	(0.01616)	(0.01743)	(0.03733)	(0.01480)
D(1978)	0.06059	0.05297	0.04856	0.08922	0.02126
	(0.01071)	(0.01604)	(0.01763)	(0.03720)	(0.01475)
R Squared	0.34442	0.31792	0.42850	0.41486	0.51905
F Statistic	406.34000	165.73000	242.68000	62.24900	423.16000
F d.f.	(16,12375)	(18, 6400)	(18, 5826)	(20, 1756)	(20, 7842)
Standard Error	0.40842	0.43752	0.46153	0.52002	0.44626
Observations	12392	6419	5845	1777	7863

hours- experience interactions), although these variables are found to be not statistically significant for architects in 1967, mathematical specialists in 1972, and physicians in 1967 and 1972. While the hours- experience interaction terms, with few exceptions, are highly significant for the nonprofessional occupations, they are frequently insignificant for the professional occupations, suggesting that age has a greater effect on the hours- productivity relationship in the nonprofessional occupations in which physicial demands of work are greater. To a lesser extent the significance of the schooling, type of employment (self- and government-) and residence variable groups reveal the same pattern, with a greater prevalence of insignificance for the professional occupations.

Examining the selfemployment coefficients, when statistically significant these are almost invariably negative for the nonprofessional occupations but are frequently positive, and in some cases quite substantial for the professional occupations, as the following percentage increments in earnings associated with selfemployment (computed only when statistically significant) indicate:

	1967	1972	1977
(1) Accountants	14%	-10%	17%
(5) Librarians & soc. sc.		-22	
(10) Hlth. prof. (ex. phys.)	30		33
(11) Physicians	23		16
(13) Hlth. technicians	38		
(16) Teachers (ex. college)			-35
(17) Writers et al.	-15	-22	-22
(21) Managers (trade)		-21	-24
(22) Oth. manag. & admin.	-22	-25	-11
(23) Sales	-7		4
(25) Crafts	-28	-24	-27
(27) Transport operatives	-20	-10	-13
(28) Laborers (nonfarm)			-12
(29) Farm laborers			19
(30) Service		-9	-18

Table III.1.4(1)
Hours Functions, 1967-69

	OC 01	OC 04	OC 05	OC 06	OC 08
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.37857	0.01044	-0.33841	-1.26944	0.53844
	(0.17102)	(0.12547)	(0.29107)	(0.47997)	(0.38247)
(AGE/10) SQ	-0.06976	-0.00463	0.07551	0.35316	-0.11916
	(0.03789)	(0.02877)	(0.05909)	(0.11137)	(0.09419)
(AGE/10) CUBED	0.00340	0.00041	-0.00581	-0.02973	0.00842
	(0.00267)	(0.00212)	(0.00383)	(0.00827)	(0.00745)
YRS OF SCH (S)	-0.00245	-0.00011	0.01448	0.01608	-0.00650
	(0.02043)	(0.00353)	(0.01525)	(0.04835)	(0.01324)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12	-0.06133			0.37796	
	(0.22074)			(0.45641)	
D(S GE 12) * S	0.00589			-0.04392	
	(0.02193)			(0.05274)	
DUMMY S GE 16	0.17556	-0.26030	0.63784	-1.41652	-0.41418
	(0.48077)	(0.21405)	(1.25499)	(1.20207)	(0.64215)
D(S GE 16) * S	-0.00998	0.01669	-0.03660	0.09145	0.02841
	(0.03013)	(0.01335)	(0.07637)	(0.07522)	(0.04048)
DUMMY S GE 18	0.05824	-0.03493	0.03719	-0.08583	-0.05528
	(0.06308)	(0.02581)	(0.11352)	(0.13564)	(0.07170)
SELF-EMPLOYED	0.32602		0.06333	0.02232	
	(0.02422)		(0.02461)	(0.08846)	
GOVERNMENT	-0.06078	-0.06295	-0.04295	-0.06584	-0.01631
	(0.01950)	(0.01001)	(0.03292)	(0.03437)	(0.02091)
SINGLE	-0.09299	-0.03055	-0.01353	-0.11297	0.06814
	(0.02775)	(0.01789)	(0.05299)	(0.06000)	(0.04329)
DIVORCED	-0.01560		-0.17822	0.00372	-0.04148
	(0.04928)		(0.06403)	(0.09390)	(0.07095)
WIDOWED				-0.00179	
				(0.13018)	
ALL CHILD < 6	0.00512	-0.01203	0.02423	0.01953	-0.01712
	(0.02180)	(0.01219)	(0.03489)	(0.04937)	(0.03179)
CHILD <6 & 6-17	-0.03247	-0.02433	-0.00998	0.02821	0.01400
	(0.02651)	(0.01336)	(0.04083)	(0.05243)	(0.03302)
ALL CHILD 6-17	-0.02216	0.00556	0.03893	0.15775	0.01328
	(0.02570)	(0.01226)	(0.03492)	(0.05980)	(0.03194)
# OF CHILD < 6					
# OF CHILD 6-17	0.00330	0.00493	0.00834	0.00618	-0.00260
	(0.00830)	(0.00374)	(0.01179)	(0.01850)	(0.01036)
D(POSTSEC CHILD)	-0.03472	0.02437	0.06762	-0.31516	-0.07863
	(0.06314)	(0.03317)	(0.08870)	(0.15831)	(0.08277)
# POSTSEC CHILD	0.01809	-0.00720	-0.08032	0.05977	0.02833
	(0.05241)	(0.02626)	(0.07234)	(0.12036)	(0.06110)
D(SPOUSE EARN>0)	0.08263	0.05634	0.05591	0.07983	-0.02842
	(0.09672)	(0.05901)	(0.18700)	(0.26471)	(0.13294)
LN(SPOUSE HOURS)	0.01273	-0.00454	0.04216	0.02966	0.00640
	(0.02736)	(0.01649)	(0.04735)	(0.08310)	(0.04038)
LN(SPOUSE EARN)	-0.01103	-0.00540	-0.02529	-0.01807	0.00543
	(0.01451)	(0.00798)	(0.02867)	(0.03194)	(0.01876)
INTERCEPT (1967)	0.23169	0.79693	1.09521	2.10323	0.05450
	(0.31653)	(0.18056)	(0.48463)	(0.74924)	(0.51527)
D(1968)	0.01223	0.00055	-0.00638	0.02350	0.03706
	(0.01641)	(0.00883)	(0.02410)	(0.03853)	(0.02292)
D(1969)	-0.01149	-0.02345	-0.00438	0.03012	0.01076
	(0.01698)	(0.00888)	(0.02478)	(0.03962)	(0.02410)
R Squared	0.25339	0.03263	0.14458	0.39817	0.04702
F Statistic	12.93900	3.93920	3.63380	3.75790	0.83883
F d.f.	(24, 915)	(20, 2336)	(22, 473)	(25, 142)	(21, 357)
Standard Error	0.20649	0.17579	0.21526	0.18873	0.18259
Observations	940	2357	496	168	379

Table III.1.4(1), continued

	OC 09	OC 10	OC 11	OC 12	OC 13
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.04273	-0.02328	-0.86523	0.86638	0.61550
	(0.10416)	(0.34335)	(0.42155)	(0.43197)	(0.39805)
(AGE/10) SQ	-0.00460	0.02515	0.18335	-0.12814	-0.13848
	(0.02430)	(0.07347)	(0.08427)	(0.09402)	(0.09251)
(AGE/10) CUBED	-0.00030	-0.00365	-0.01304	0.00524	0.00894
	(0.00180)	(0.00503)	(0.00537)	(0.00653)	(0.00678)
YRS OF SCH (S)	0.00155	-0.02897	0.01897	0.02673	0.02779
	(0.00766)	(0.01602)	(0.02634)	(0.02014)	(0.02390)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12	0.11582			-0.11884	0.99728
	(0.09790)			(0.36225)	(0.40869)
D(S GE 12) * S	-0.01041			0.01110	-0.08734
	(0.00902)			(0.03088)	(0.03597)
DUMMY S GE 16	-0.70672	-0.79777		-0.33994	1.37190
	(0.37979)	(0.83717)		(1.11803)	(1.83859)
D(S GE 16) * S	0.04544	0.05660		0.01886	-0.07546
	(0.02321)	(0.05245)		(0.06981)	(0.11354)
DUMMY S GE 18		-0.14073	0.16914	-0.09646	0.35330
		(0.09140)	(0.12843)	(0.11836)	(0.20111)
SELF-EMPLOYED		0.03501	0.08941		0.00824
		(0.03179)	(0.03437)		(0.08888)
GOVERNMENT	-0.05424	-0.05722	-0.06417		-0.01440
	(0.01233)	(0.06186)	(0.04992)		(0.04827)
SINGLE	-0.07215	-0.17570	0.00482	0.08040	-0.08939
	(0.01895)	(0.05877)	(0.07902)	(0.05503)	(0.08871)
DIVORCED	-0.01798	0.00023	0.19690		
	(0.02540)	(0.08246)	(0.10506)		
WIDOWED					
ALL CHILD < 6	-0.01204	-0.05318	-0.04207	-0.12439	0.10429
	(0.01603)	(0.04059)	(0.04430)	(0.04922)	(0.07500)
CHILD <6 & 6-17	-0.00967	-0.09610	-0.01199	0.00998	-0.07373
	(0.01616)	(0.05295)	(0.05802)	(0.06383)	(0.07515)
ALL CHILD 6-17	-0.02055	-0.08517	-0.00799	0.04469	0.03432
	(0.01679)	(0.04507)	(0.04647)	(0.05351)	(0.07909)
# OF CHILD < 6					
# OF CHILD 6-17	0.00550	0.01046	0.01839	-0.02945	-0.00538
	(0.00568)	(0.01390)	(0.01307)	(0.01870)	(0.02766)
D(POSTSEC CHILD)	0.11725	-0.14802	-0.04046	-0.12421	-0.13447
	(0.07069)	(0.10694)	(0.07873)	(0.10953)	(0.08084)
# POSTSEC CHILD	-0.17151	0.08299	0.02383	0.05334	
	(0.06144)	(0.08501)	(0.05271)	(0.08336)	
D(SPOUSE EARN>0)	0.01451	0.35210	0.26988	0.21345	0.10098
	(0.06778)	(0.19596)	(0.28083)	(0.17488)	(0.38568)
LN(SPOUSE HOURS)	0.02565	0.08583	-0.01648	0.05271	0.03246
	(0.02074)	(0.05454)	(0.07285)	(0.04578)	(0.07091)
LN(SPOUSE EARN)	-0.01587	-0.08111	-0.02392	-0.05727	-0.02183
	(0.00961)	(0.03021)	(0.04255)	(0.02671)	(0.04849)
INTERCEPT (1967)	0.73343	1.26684	1.92824	-0.92769	-0.23783
	(0.16280)	(0.55578)	(0.77062)	(0.67093)	(0.59569)
D(1968)	-0.02898	-0.02874	-0.08315	-0.03994	0.03199
	(0.01164)	(0.03092)	(0.03230)	(0.03542)	(0.05212)
D(1969)	-0.02237	-0.04829	-0.04626	0.02163	-0.05052
	(0.01217)	(0.03105)	(0.03335)	(0.03580)	(0.05153)
R Squared	0.07138	0.15687	0.19947	0.24669	0.20885
F Statistic	4.67150	3.58580	5.18270	5.94140	1.57190
F d.f.	(22, 1337)	(22, 424)	(20, 416)	(21, 381)	(22, 131)
Standard Error	0.17625	0.26347	0.27710	0.27688	0.24422
Observations	1360	447	437	403	154

Table III.1.4(1), continued

	OC 14	OC 15	OC 16	OC 17	OC 18
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.47586	0.95744	-0.05765	0.23217	0.04878
	(0.17431)	(0.44843)	(0.22070)	(0.14846)	(0.17705)
(AGE/10) SQ	-0.09279	-0.18082	0.01645	-0.03625	-0.01249
	(0.04178)	(0.10168)	(0.05266)	(0.03263)	(0.03582)
(AGE/10) CUBED	0.00548	0.01096	-0.00169	0.00132	0.00079
	(0.00321)	(0.00739)	(0.00401)	(0.00226)	(0.00232)
YRS OF SCH (S)	0.00171	-0.02077	0.00440	-0.02935	-0.01047
	(0.01450)	(0.01824)	(0.00564)	(0.01565)	(0.01436)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12	0.06081			-0.19400	-0.16376
	(0.16419)			(0.19812)	(0.18222)
D(S GE 12) * S	-0.00756			0.02131	0.01279
	(0.01600)			(0.01823)	(0.01716)
DUMMY S GE 16	0.35316	-1.19688	-0.08093	-0.47295	-0.41398
	(0.43970)	(1.45134)	(0.29141)	(0.50693)	(0.60878)
D(S GE 16) * S	-0.01887	0.08134	0.00677	0.03212	0.02501
	(0.02730)	(0.08781)	(0.01804)	(0.03162)	(0.03783)
DUMMY S GE 18	0.05485	-0.06989	0.03297	0.00314	-0.00133
	(0.04914)	(0.12060)	(0.02825)	(0.05529)	(0.07008)
SELF-EMPLOYED				0.00233	
				(0.02658)	
GOVERNMENT	-0.04734	-0.03370	-0.01896	0.02497	
	(0.01260)	(0.02768)	(0.02021)	(0.02080)	
SINGLE	-0.04626	-0.09977	-0.06034	-0.05835	-0.06663
	(0.02485)	(0.06055)	(0.02390)	(0.02907)	(0.04078)
DIVORCED	-0.02073		-0.03986	-0.00994	-0.00595
	(0.03895)		(0.04725)	(0.04693)	(0.04816)
WIDOWED					-0.03952
					(0.06813)
ALL CHILD < 6	-0.01656	0.01818	-0.05388	-0.00005	-0.01250
	(0.01914)	(0.04322)	(0.01944)	(0.02411)	(0.02533)
CHILD <6 & 6-17	-0.01001	-0.00103	0.00226	-0.02219	-0.00931
	(0.02096)	(0.04662)	(0.02120)	(0.02859)	(0.03757)
ALL CHILD 6-17	0.01871	0.06569	-0.00111	-0.05553	0.04519
	(0.02045)	(0.04309)	(0.02102)	(0.02838)	(0.03273)
# OF CHILD < 6					
# OF CHILD 6-17	-0.00058	-0.00004	0.00120	0.01495	-0.01278
	(0.00595)	(0.01358)	(0.00665)	(0.00852)	(0.00902)
D(POSTSEC CHILD)	-0.06573	-0.19719	0.05096	-0.05392	-0.06410
	(0.05953)	(0.11817)	(0.05810)	(0.07233)	(0.07161)
# POSTSEC CHILD	-0.01887	0.15518	-0.04677	-0.00496	0.07384
	(0.04982)	(0.09951)	(0.04858)	(0.05663)	(0.06163)
D(SPOUSE EARN>0)	-0.12935	-0.03930	-0.06739	-0.37736	-0.10571
	(0.09204)	(0.19076)	(0.08414)	(0.12019)	(0.14157)
LN(SPOUSE HOURS)	0.06283	0.04041	0.06796	-0.00117	-0.08359
	(0.02360)	(0.04200)	(0.02140)	(0.03166)	(0.03250)
LN(SPOUSE EARN)	-0.00788	-0.01707	-0.02467	0.04021	0.04541
	(0.01215)	(0.02553)	(0.01186)	(0.01703)	(0.01893)
INTERCEPT (1967)	0.05715	-0.51276	0.77126	0.65040	0.88946
	(0.28613)	(0.67698)	(0.30128)	(0.26716)	(0.31211)
D(1968)	0.00706	-0.05323	-0.00133	0.00671	-0.00555
	(0.01454)	(0.03089)	(0.01469)	(0.01878)	(0.01923)
D(1969)	0.00392	-0.02730	0.02049	0.03231	-0.00762
	(0.01438)	(0.03140)	(0.01446)	(0.01908)	(0.01982)
R Squared	0.06758	0.11622	0.06861	0.07893	0.03841
F Statistic	5.20890	3.01800	4.57400	3.72420	1.05590
F d.f.	(23, 1653)	(20, 459)	(21, 1304)	(24, 1043)	(23, 608)
Standard Error	0.23601	0.27242	0.21427	0.25123	0.19286
Observations	1677	480	1326	1068	632

Table III.1.4(1), continued

	OC 21	OC 22	OC 23	OC 24	OC 25
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	-0.05489	0.10888	0.40781	0.42630	0.00481
	(0.14776)	(0.06063)	(0.06730)	(0.05064)	(0.03962)
(AGE/10) SQ	0.01519	-0.01272	-0.06282	-0.07672	0.00598
	(0.03292)	(0.01314)	(0.01520)	(0.01191)	(0.00932)
(AGE/10) CUBED	-0.00149	-0.00009	0.00221	0.00389	-0.00107
	(0.00233)	(0.00091)	(0.00109)	(0.00089)	(0.00070)
YRS OF SCH (S)	-0.01693	0.00531	0.00069	-0.00878	0.00316
	(0.00957)	(0.00258)	(0.00415)	(0.00296)	(0.00314)
DUMMY S GE 8					0.04652
					(0.02769)
D(S GE 8) * S					-0.00438
					(0.00372)
DUMMY S GE 12	-0.17442	0.14175	0.18293	0.06240	-0.03305
	(0.12640)	(0.04303)	(0.06187)	(0.04753)	(0.03021)
D(S GE 12) * S	0.01872	-0.01354	-0.01088	-0.00176	0.00456
	(0.01163)	(0.00379)	(0.00552)	(0.00421)	(0.00271)
DUMMY S GE 16	-0.42036	-0.11452	-0.10307	0.30667	
	(0.42377)	(0.10607)	(0.20565)	(0.19295)	
D(S GE 16) * S	0.02542	0.00851	0.00857	-0.01510	
	(0.02640)	(0.00666)	(0.01281)	(0.01186)	
DUMMY S GE 18					
SELF-EMPLOYED		0.11083	0.04409		0.02417
		(0.00543)	(0.01203)		(0.00736)
GOVERNMENT				-0.03178	-0.02277
				(0.00588)	(0.00551)
SINGLE	-0.08541	-0.06226	-0.09899	-0.07176	-0.06079
	(0.02950)	(0.01269)	(0.01516)	(0.00929)	(0.00780)
DIVORCED	0.04334		0.00105	0.01049	-0.01441
	(0.04072)		(0.02182)	(0.01677)	(0.00995)
WIDOWED					
ALL CHILD < 6	-0.03766	0.00078	0.00605	-0.00800	-0.00872
	(0.01993)	(0.00745)	(0.01082)	(0.00781)	(0.00493)
CHILD <6 & 6-17	-0.03609	0.00608	0.02308	0.02709	0.00993
	(0.02360)	(0.00988)	(0.01309)	(0.00995)	(0.00624)
ALL CHILD 6-17	-0.04162	0.00548	0.01574	-0.00424	0.00710
	(0.02252)	(0.00846)	(0.01279)	(0.01050)	(0.00556)
# OF CHILD < 6					
# OF CHILD 6-17	0.01058	0.00206	-0.00323	-0.00414	0.00055
	(0.00734)	(0.00255)	(0.00384)	(0.00305)	(0.00164)
D(POSTSEC CHILD)	-0.15961	-0.02178	-0.03747	-0.03552	-0.02145
	(0.06740)	(0.02209)	(0.03289)	(0.02752)	(0.02292)
# POSTSEC CHILD	0.17703	0.02094	-0.01796	-0.00590	0.01044
	(0.05719)	(0.01836)	(0.02648)	(0.02259)	(0.01988)
D(SPOUSE EARN>0)	-0.16148	0.00566	-0.08627	0.07753	0.00469
	(0.10425)	(0.03664)	(0.05613)	(0.04379)	(0.02552)
LN(SPOUSE HOURS)	0.00015	0.04131	0.02451	0.01250	0.00448
	(0.02643)	(0.00873)	(0.01423)	(0.01107)	(0.00664)
LN(SPOUSE EARN)	0.01670	-0.01946	-0.00157	-0.01695	-0.00336
	(0.01373)	(0.00501)	(0.00766)	(0.00568)	(0.00332)
INTERCEPT (1967)	1.07432	0.63148	0.09567	0.18869	0.70431
	(0.24042)	(0.09329)	(0.10529)	(0.07561)	(0.05739)
D(1968)	-0.01797	0.00017	-0.01233	-0.00428	-0.00500
	(0.01549)	(0.00565)	(0.00827)	(0.00627)	(0.00378)
D(1969)	0.01469	-0.00297	-0.01751	-0.01476	-0.01259
	(0.01547)	(0.00572)	(0.00835)	(0.00637)	(0.00382)
R Squared	0.37309	0.05680	0.12826	0.10928	0.02087
F Statistic	3.27430	33.26700	30.50400	31.03500	16.00900
F d.f.	(21, 872)	(21,11601)	(22, 4561)	(22, 5565)	(23,17278)
Standard Error	0.18695	0.24949	0.22806	0.19253	0.20411
Observations	894	11623	4584	5588	17302

Table III.1.4(1), concluded

	OC 26	OC 27	OC 28	OC 29	OC 30
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.07102	0.46790	0.47914	0.87138	0.53669
	(0.04276)	(0.08228)	(0.07861)	(0.17502)	(0.06150)
(AGE/10) SQ	-0.00622	-0.09563	-0.09223	-0.17674	-0.09513
	(0.01029)	(0.02002)	(0.01947)	(0.04205)	(0.01369)
(AGE/10) CUBED	-0.00039	0.00601	0.00535	0.01077	0.00471
	(0.00079)	(0.00155)	(0.00152)	(0.00317)	(0.00096)
YRS OF SCH (S)	0.00251	0.01022	0.01082	0.00946	0.00304
	(0.00282)	(0.00618)	(0.00429)	(0.00871)	(0.00515)
DUMMY S GE 8	0.03855	0.04185	0.11902	0.27402	0.19906
	(0.02828)	(0.05577)	(0.05127)	(0.13897)	(0.05744)
D(S GE 8) * S	-0.00508	-0.00618	-0.01642	-0.03348	-0.02216
	(0.00367)	(0.00742)	(0.00642)	(0.01649)	(0.00729)
DUMMY S GE 12	0.02623	0.32995	0.22193	0.40893	-0.07776
	(0.03986)	(0.07678)	(0.09149)	(0.32034)	(0.07201)
D(S GE 12) * S	0.00063	-0.02587	-0.01275	-0.02144	0.01428
	(0.00353)	(0.00667)	(0.00792)	(0.02739)	(0.00659)
DUMMY S GE 16				-2.40202	
				(2.13734)	
D(S GE 16) * S				0.15669	
				(0.13278)	
DUMMY S GE 18				-0.25012	
				(0.26494)	
SELF-EMPLOYED		0.08180			0.10516
		(0.01738)			(0.01629)
GOVERNMENT		-0.07499	0.01696	-0.18982	0.02905
		(0.01311)	(0.01143)	(0.04714)	(0.00855)
SINGLE	-0.06552	-0.09429	-0.05451	-0.05886	-0.08617
	(0.00769)	(0.01552)	(0.01434)	(0.03697)	(0.01485)
DIVORCED	-0.00371	-0.06046	-0.05196	-0.13351	-0.05362
	(0.01145)	(0.02129)	(0.02234)	(0.05866)	(0.02146)
WIDOWED					
ALL CHILD < 6	-0.00390	-0.00409	0.00381	-0.02000	0.00520
	(0.00600)	(0.01124)	(0.01205)	(0.03267)	(0.01170)
CHILD <6 & 6-17	0.02204	-0.00550	0.04336	0.06537	0.03070
	(0.00716)	(0.01399)	(0.01528)	(0.04155)	(0.01657)
ALL CHILD 6-17	0.02160	0.01353	0.00141	0.02261	0.02811
	(0.00698)	(0.01329)	(0.01585)	(0.03922)	(0.01568)
# OF CHILD < 6					
# OF CHILD 6-17	-0.00066	-0.00259	-0.00743	-0.01701	-0.00227
	(0.00198)	(0.00369)	(0.00405)	(0.00868)	(0.00413)
D(POSTSEC CHILD)	0.01211	0.04809	-0.07793	-0.03589	-0.14398
	(0.03168)	(0.04370)	(0.06876)	(0.17254)	(0.04910)
# POSTSEC CHILD	-0.02614	-0.00988	-0.01261	0.05310	0.05171
	(0.02710)	(0.03521)	(0.06133)	(0.14473)	(0.04154)
D(SPOUSE EARN>0)	0.00604	0.02272	-0.05779	-0.07021	0.02364
	(0.03230)	(0.05959)	(0.07727)	(0.17794)	(0.06726)
LN(SPOUSE HOURS)	0.01307	0.02605	0.05010	0.05229	0.01770
	(0.00872)	(0.01578)	(0.01980)	(0.04119)	(0.01717)
LN(SPOUSE EARN)	-0.00769	-0.01829	-0.01472	-0.01794	-0.01227
	(0.00423)	(0.00799)	(0.00984)	(0.02545)	(0.00904)
INTERCEPT (1967)	0.59405	0.07289	-0.07620	-0.40715	-0.09674
	(0.05928)	(0.11585)	(0.10424)	(0.23615)	(0.09434)
D(1968)	0.00361	0.00471	-0.00047	0.02159	-0.00963
	(0.00466)	(0.00878)	(0.00991)	(0.02600)	(0.00946)
D(1969)	-0.00589	-0.00734	-0.02094	0.04839	-0.01172
	(0.00474)	(0.00908)	(0.01005)	(0.02751)	(0.00969)
R Squared	0.03405	0.07652	0.11883	0.13248	0.15481
F Statistic	17.23300	16.20500	19.10600	5.43630	31.80600
F d.f.	(21,10268)	(23, 4498)	(22, 3117)	(25, 890)	(23, 3994)
Standard Error	0.19470	0.24479	0.22688	0.32634	0.24789
Observations	10290	4522	3140	916	4018

Table III.1.4(2)
Hours Functions, 1971-74

	OC 01	OC 02	OC 03	OC 04	OC 05
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	-0.02478 (0.16076)	0.61637 (0.70348)	0.70347 (0.35348)	-0.02823 (0.11230)	0.53790 (0.23142)
(AGE/10) SQ	0.01144 (0.03603)	-0.14034 (0.15986)	-0.15934 (0.09187)	0.01634 (0.02534)	-0.09161 (0.04731)
(AGE/10) CUBED	-0.00114 (0.00257)	0.00981 (0.01164)	0.01139 (0.00768)	-0.00202 (0.00184)	0.00428 (0.00307)
YRS OF SCH (S)	0.00668 (0.00603)	0.09395 (0.06858)	-0.00784 (0.00722)	-0.00040 (0.00373)	-0.02540 (0.01113)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		0.70459 (0.69683)			
D(S GE 12) * S		-0.08888 (0.07507)			
DUMMY S GE 16	0.07137 (0.39557)	-0.73917 (0.82119)	0.32746 (0.45689)	0.23267 (0.20382)	1.05508 (1.00654)
D(S GE 16) * S	-0.00316 (0.02473)	0.04936 (0.05365)	-0.02015 (0.02839)	-0.01412 (0.01274)	-0.05401 (0.06182)
DUMMY S GE 18	0.01357 (0.04908)	-0.12700 (0.08303)	0.05632 (0.05479)	0.02924 (0.02400)	0.19044 (0.10316)
SELF-EMPLOYED	0.22360 (0.02042)	0.05638 (0.03898)	0.54927 (0.12585)		0.03177 (0.02144)
STATE-LOCAL GOVT	-0.09730 (0.02244)	-0.00886 (0.05785)	-0.04841 (0.02628)	-0.04327 (0.01273)	-0.08108 (0.02795)
FEDERAL GOVT	-0.08830 (0.02471)	-0.00696 (0.09176)	-0.04791 (0.02583)	-0.05933 (0.01552)	-0.08616 (0.03964)
SINGLE	-0.06844 (0.02447)	-0.06434 (0.10379)	-0.06101 (0.03034)	-0.01890 (0.01829)	-0.15066 (0.04070)
DIVORCED	0.03519 (0.03776)	-0.11496 (0.11572)	-0.05595 (0.04325)	-0.01348 (0.02372)	0.06276 (0.05711)
WIDOWED		-0.06228 (0.20168)			
ALL CHILD < 6	-0.02155 (0.01897)	-0.10048 (0.05469)	-0.03691 (0.02607)	-0.00733 (0.01196)	-0.00371 (0.03120)
CHILD <6 & 6-17	-0.01009 (0.02167)	-0.06776 (0.06008)	0.01882 (0.02431)	-0.01522 (0.01379)	0.02647 (0.03605)
ALL CHILD 6-17	-0.02104 (0.02467)	0.13590 (0.07664)	0.02727 (0.02786)	0.00480 (0.01312)	-0.00960 (0.03370)
# OF CHILD < 6					
# OF CHILD 6-17	0.00751 (0.00777)	-0.04207 (0.01990)	-0.01932 (0.00862)	0.00514 (0.00405)	0.00259 (0.01227)
D(POSTSEC CHILD)	-0.01101 (0.05472)	0.00337 (0.13637)	-0.31445 (0.12170)	-0.06615 (0.03252)	-0.10960 (0.05862)
# POSTSEC CHILD	-0.01062 (0.04372)	0.00304 (0.10805)	0.20250 (0.09805)	0.06054 (0.02618)	0.04858 (0.04324)
D(SPOUSE EARN>0)	-0.00492 (0.09443)	0.11719 (0.25342)	0.02232 (0.12423)	0.02291 (0.05334)	-0.03209 (0.13976)
LN(SPOUSE HOURS)	-0.00455 (0.02298)	0.00464 (0.05484)	0.06899 (0.03319)	0.00844 (0.01382)	0.01757 (0.03516)
LN(SPOUSE EARN)	0.00146 (0.01369)	-0.00957 (0.02934)	-0.03315 (0.01582)	-0.00754 (0.00674)	-0.00284 (0.01965)
INTERCEPT (1971)	0.69237 (0.24276)	-0.73446 (1.08318)	-0.03686 (0.45112)	0.77842 (0.16611)	0.13777 (0.37776)
D(1972)	0.01435 (0.01679)	-0.10303 (0.04433)	-0.03880 (0.02201)	-0.00435 (0.01012)	0.03360 (0.02489)
D(1973)	0.02748 (0.01652)	-0.09882 (0.04764)	-0.01812 (0.02166)	0.00763 (0.01013)	0.02543 (0.02530)
D(1974)	0.01494 (0.01690)	-0.09449 (0.04702)	0.02830 (0.02223)	-0.01001 (0.01027)	0.04438 (0.02530)
R Squared	0.17020	0.23043	0.14261	0.03516	0.17676
F Statistic	10.93900	1.31970	3.43050	3.81010	6.34280
F d.f.	(24, 1280)	(27, 119)	(24, 495)	(23, 2405)	(24, 709)
Standard Error	0.21022	0.18455	0.17280	0.17720	0.23526
Observations	1305	147	520	2429	734

Table III.1.4(2), continued

	OC 06	OC 07	OC 08	OC 09	OC 10
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	-0.19238	-0.35285	0.61633	0.03730	0.13938
	(0.46429)	(0.44401)	(0.31555)	(0.13185)	(0.27235)
(AGE/10) SQ	0.05133	0.07269	-0.13451	-0.00065	-0.01008
	(0.11094)	(0.10817)	(0.07301)	(0.03317)	(0.05914)
(AGE/10) CUBED	-0.00382	-0.00499	0.00940	-0.00050	-0.00099
	(0.00849)	(0.00848)	(0.00540)	(0.00267)	(0.00408)
YRS OF SCH (S)	0.01651	-0.11201	-0.00435	-0.02462	0.03006
	(0.01230)	(0.05592)	(0.00926)	(0:01000)	(0.09152)
DUMMY S GE 8					
O(S GE 8) * S					
DUMMY S GE 12		-1.16971		-0.08246	0.91786
		(0.56644)		(0.11459)	(0.86714)
O(S GE 12) * S		0.11495		0.01358	-0.08025
		(0.05715)		(0.01095)	(0.09398)
DUMMY S GE 16	0.52536	0.92099	-0.20835	-0.28651	-0.21054
	(0.77790)	(0.85775)	(0.53918)	(0.55844)	(0.67104)
O(S GE 16) * S	-0.03363	-0.05673	0.01343	0.02038	0.02307
	(0.04808)	(0.05348)	(0.03356)	(0.03440)	(0.04287)
DUMMY S GE 18	0.07425	0.07860	-0.02039	-0.05485	-0.04356
	(0.08058)	(0.10102)	(0.05917)	(0.07079)	(0.06615)
SELF-EMPLOYED	0.01621		0.33242		0.02428
	(0.05787)		(0.05991)		(0.02510)
STATE-LOCAL GOVT	-0.08432	-0.06929	-0.02001	-0.04577	-0.03725
	(0.03043)	(0.04384)	(0.02545)	(0.01384)	(0.03958)
FEDERAL GOVT	-0.07816	0.01977	-0.05380	-0.03350	-0.08065
	(0.04741)	(0.03437)	(0.03164)	(0.01877)	(0.13394)
SINGLE	-0.11296	-0.02628	0.06055	-0.04118	-0.04996
	(0.05273)	(0.05584)	(0.04215)	(0.01880)	(0.04676)
DIVORCED	-0.08028	0.01069	0.04588	0.00554	
	(0.07403)	(0.06682)	(0.07015)	(0.02654)	
WIDOWED					
ALL CHILD < 6	-0.03872	-0.03301	0.04775	-0.00298	-0.03234
	(0.04411)	(0.03989)	(0.03114)	(0.01453)	(0.03382)
CHILD <6 & 6-17	-0.00662	-0.02722	0.00568	0.01921	-0.00475
	(0.04616)	(0.04294)	(0.03280)	(0.01622)	(0.03950)
ALL CHILD 6-17	-0.03479	0.01182	0.02584	-0.00037	-0.00375
	(0.05285)	(0.04112)	(0.03749)	(0.01663)	(0.03807)
# OF CHILD < 6					
# OF CHILD 6-17	-0.00760	-0.00117	0.00874	0.00559	-0.00252
	(0.01820)	(0.01375)	(0.01014)	(0.00539)	(0.01090)
D(POSTSEC CHILD)	-0.07529	-0.29606	-0.14811	0.03719	0.03324
	(0.14265)	(0.12263)	(0.06999)	(0.05697)	(0.07319)
# POSTSEC CHILD	0.02818	0.22513	0.11897	-0.05631	-0.02849
	(0.12241)	(0.09769)	(0.05160)	(0.04768)	(0.05281)
O(SPOUSE EARN>0)	0.00742	0.12988	0.14256	0.03842	0.34225
	(0.17178)	(0.16201)	(0.13450)	(0.07069)	(0.20600)
LN(SPOUSE HOURS)	0.03012	0.02100	0.00117	-0.01884	0.00966
	(0.04940)	(0.04750)	(0.03707)	(0.01906)	(0.04060)
LN(SPOUSE EARN)	-0.01962	-0.02500	-0.01888	0.00381	-0.04552
	(0.01909)	(0.02590)	(0.01784)	(0.00911)	(0.02720)
INTERCEPT (1971)	0.85519	2.44987	-0.10318	0.88632	0.30370
	(0.65551)	(0.77804)	(0.44622)	(0.20138)	(0.91586)
O(1972)	-0.03062	0.01189	-0.00111	0.00565	0.01335
	(0.03689)	(0.03483)	(0.02654)	(0.01288)	(0.02864)
O(1973)	-0.04046	-0.00170	-0.00769	-0.01592	-0.00106
	(0.03819)	(0.03338)	(0.02716)	(0.01272)	(0.02869)
O(1974)	-0.05291	0.01846	0.04114	-0.01570	0.00404
	(0.03622)	(0.03236)	(0.02638)	(0.01276)	(0.02885)
R Squared	0.11574	0.08400	0.11800	0.04481	0.08772
F Statistic	1.54350	0.95368	2.31330	3.01560	2.53840
F d.f.	(24, 283)	(25, 260)	(24, 415)	(25, 1607)	(25, 660)
Standard Error	0.21814	0.18965	0.19153	0.18310	0.26135
Observations	308	286	440	1633	686

Table III.1.4(2), continued

	OC 11	OC 12	OC 13	OC 14	OC 15
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	-1.10068	0.59399	0.54608	0.48620	0.85087
	(0.41986)	(0.37865)	(0.53027)	(0.25848)	(0.35042)
(AGE/10) SQ	0.22701	-0.08839	-0.09156	-0.09657	-0.14485
	(0.08705)	(0.08190)	(0.13292)	(0.06060)	(0.07859)
(AGE/10) CUBED	-0.01595	0.00368	0.00449	0.00619	0.00738
	(0.00578)	(0.00566)	(0.01063)	(0.00456)	(0.00567)
YRS OF SCH (S)	-0.00673	0.03069	0.03077	-0.01675	-0.02127
	(0.02602)	(0.03297)	(0.07056)	(0.02470)	(0.01685)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		0.50103	0.46637	-0.03018	
		(0.44135)	(0.73220)	(0.29202)	
D(S GE 12) * S		-0.04512	-0.03977	0.00840	
		(0.04124)	(0.07259)	(0.02734)	
DUMMY S GE 16		0.24596	1.25307	-0.20770	-2.41149
		(1.14624)	(1.53074)	(0.61956)	(1.14786)
D(S GE 16) * S		-0.00620	-0.07610	0.01540	0.15358
		(0.07152)	(0.09518)	(0.03856)	(0.07027)
DUMMY S GE 18	0.31899	0.01317	0.23691	-0.01528	-0.09214
	(0.13022)	(0.11945)	(0.17751)	(0.06653)	(0.10591)
SELF-EMPLOYED	-0.02605	-0.11703	0.06579		
	(0.02884)	(0.07502)	(0.11061)		
STATE-LOCAL GOVT	-0.10924		-0.05486	-0.06120	-0.01269
	(0.03597)		(0.04182)	(0.02211)	(0.02356)
FEDERAL GOVT	-0.40440			-0.05827	
	(0.12211)			(0.03348)	
SINGLE	-0.12842	0.01604	0.05705	-0.03697	-0.01298
	(0.07084)	(0.05313)	(0.07487)	(0.03961)	(0.04773)
DIVORCED	-0.07477		0.10328	0.01677	0.06511
	(0.09237)		(0.13069)	(0.06852)	(0.05443)
WIDOWED			-0.06588		
			(0.13615)		
ALL CHILD < 6	-0.04312	-0.12387	-0.05204	-0.04492	0.06931
	(0.04194)	(0.04909)	(0.06009)	(0.03071)	(0.03699)
CHILD <6 & 6-17	0.00976	-0.05596	0.01547	0.00576	0.06007
	(0.04717)	(0.05336)	(0.06274)	(0.03417)	(0.03808)
ALL CHILD 6-17	-0.00967	0.03212	0.07401	0.03068	0.04879
	(0.04204)	(0.05113)	(0.06932)	(0.03681)	(0.04071)
# OF CHILD < 6					
# OF CHILD 6-17	-0.00319	-0.01582	-0.00933	-0.00979	0.01172
	(0.01396)	(0.01799)	(0.02163)	(0.01122)	(0.01363)
D(POSTSEC CHILD)	-0.04956	0.07688	-0.08840	-0.19449	-0.23749
	(0.06623)	(0.12026)	(0.15446)	(0.08850)	(0.09275)
# POSTSEC CHILD	0.06726	-0.11085	-0.08085	0.08372	0.11546
	(0.03993)	(0.09724)	(0.10663)	(0.07269)	(0.07289)
D(SPOUSE EARN>0)	-0.27242	-0.06787	0.24289	-0.13160	-0.22065
	(0.16810)	(0.14624)	(0.26118)	(0.14109)	(0.13524)
LN(SPOUSE HOURS)	0.11568	0.03772	0.05508	0.01947	0.07632
	(0.03815)	(0.03844)	(0.06548)	(0.04123)	(0.03237)
LN(SPOUSE EARN)	-0.01475	-0.01536	-0.04526	0.00946	-0.00378
	(0.02100)	(0.02249)	(0.03080)	(0.01881)	(0.02202)
INTERCEPT (1971)	2.73821	-0.32186	-0.51472	0.20132	-0.59496
	(0.73203)	(0.63224)	(1.09436)	(0.44945)	(0.57068)
D(1972)	-0.01438	-0.01278	0.02785	-0.05184	0.01007
	(0.03301)	(0.03639)	(0.05030)	(0.02767)	(0.03126)
D(1973)	-0.07762	-0.01425	-0.00039	-0.02576	0.06490
	(0.03372)	(0.03617)	(0.04986)	(0.02748)	(0.03181)
D(1974)	-0.02922	-0.02067	0.00537	-0.02815	0.05782
	(0.03442)	(0.03639)	(0.04869)	(0.02751)	(0.03116)
R Squared	0.18163	0.13838	0.22232	0.06866	0.12813
F Statistic	5.83100	3.34480	2.00110	2.08470	4.61590
F d.f.	(22, 578)	(23, 479)	(26, 182)	(25, 707)	(22, 691)
Standard Error	0.29046	0.27910	0.24428	0.25509	0.28482
Observations	601	503	209	733	714

Table III.1.4(2), continued

	OC 16	OC 17	OC 18	OC 19	OC 20
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	-0.06456	0.24663	-0.02750	-0.12074	-0.26192
	(0.16727)	(0.16569)	(0.18563)	(0.15507)	(0.34231)
(AGE/10) SQ	0.03072	-0.04425	0.01647	0.04045	0.07510
	(0.04064)	(0.03736)	(0.03952)	(0.03301)	(0.07576)
(AGE/10) CUBED	-0.00350	0.00246	-0.00186	-0.00417	-0.00622
	(0.00316)	(0.00266)	(0.00269)	(0.00223)	(0.00540)
YRS OF SCH (S)	-0.00203	-0.01384	0.01521	0.00211	-0.04871
	(0.00663)	(0.01239)	(0.01221)	(0.02369)	(0.04696)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		0.12191	0.11745	-0.04971	-0.66958
		(0.17107)	(0.15571)	(0.25467)	(0.48799)
D(S GE 12) * S		-0.00602	-0.01272	0.00548	0.07717
		(0.01538)	(0.01438)	(0.02492)	(0.05078)
DUMMY S GE 16	0.16562	0.29890	-1.04339	-0.89102	0.35325
	(0.23685)	(0.63844)	(0.54493)	(0.49500)	(0.63977)
D(S GE 16) * S	-0.00449	-0.01145	0.06543	0.05476	-0.02796
	(0.01497)	(0.03980)	(0.03394)	(0.03098)	(0.04028)
DUMMY S GE 18	0.01366	0.04269	-0.08877	-0.11041	0.05096
	(0.02245)	(0.07686)	(0.06361)	(0.06101)	(0.05199)
SELF-EMPLOYED		0.03752			
		(0.02248)			
STATE-LOCAL GOVT	-0.00580	0.03106	0.03290		-0.06734
	(0.01529)	(0.03636)	(0.01341)		(0.02152)
FEDERAL GOVT		-0.04876			
		(0.04306)			
SINGLE	-0.01385	-0.02977	-0.02252	-0.05753	-0.06074
	(0.01896)	(0.03126)	(0.03271)	(0.03226)	(0.04365)
DIVORCED	-0.02035	0.01850	0.02537	0.04423	0.02953
	(0.03000)	(0.03794)	(0.03902)	(0.04296)	(0.06433)
WIDOWED					
ALL CHILD < 6	-0.02630	-0.02833	0.00436	-0.04968	-0.02972
	(0.01567)	(0.02637)	(0.02115)	(0.02268)	(0.02960)
CHILD <6 & 6-17	-0.00331	-0.02071	-0.00675	-0.05088	-0.00363
	(0.01683)	(0.03062)	(0.02973)	(0.02388)	(0.03354)
ALL CHILD 6-17	0.01081	0.05745	0.01993	0.04995	0.03350
	(0.01898)	(0.03122)	(0.02755)	(0.02338)	(0.02968)
# OF CHILD < 6					
# OF CHILD 6-17	0.00589	0.00185	0.01172	-0.01590	0.00475
	(0.00619)	(0.00979)	(0.00838)	(0.00942)	(0.01097)
D(POSTSEC CHILD)	-0.08833	0.01401	0.10954	0.08499	-0.08305
	(0.04500)	(0.09493)	(0.05604)	(0.06119)	(0.06479)
# POSTSEC CHILD	0.07382	-0.01426	-0.07296	-0.07934	0.06429
	(0.03452)	(0.08005)	(0.04319)	(0.04945)	(0.04814)
D(SPOUSE EARN>0)	-0.03217	-0.14020	0.06984	0.16477	-0.18290
	(0.06504)	(0.13089)	(0.10055)	(0.08900)	(0.10686)
LN(SPOUSE HOURS)	0.04445	0.08103	0.08519	-0.00844	0.01999
	(0.01657)	(0.03178)	(0.02698)	(0.02508)	(0.02667)
LN(SPOUSE EARN)	-0.01380	-0.01879	-0.04429	-0.01964	0.01533
	(0.00941)	(0.01511)	(0.01445)	(0.01352)	(0.01640)
INTERCEPT (1971)	0.76656	0.49066	0.54376	0.91619	1.42069
	(0.23789)	(0.26554)	(0.30031)	(0.31733)	(0.68604)
D(1972)	0.01604	0.00624	-0.00164	-0.02724	0.00562
	(0.01352)	(0.02259)	(0.01795)	(0.01860)	(0.02519)
D(1973)	0.00343	-0.01140	0.00481	-0.01711	0.00881
	(0.01364)	(0.02269)	(0.01826)	(0.01820)	(0.02402)
D(1974)	0.00673	-0.03429	0.00535	-0.01133	0.02100
	(0.01370)	(0.02250)	(0.01809)	(0.01894)	(0.02414)
R Squared	0.04618	0.06821	0.05926	0.09863	0.06757
F Statistic	4.12020	2.86920	2.19840	4.02020	1.94150
F d.f.	(22, 1872)	(26, 1019)	(24, 836)	(23, 845)	(24, 643)
Standard Error	0.20668	0.25568	0.18615	0.18791	0.21478
Observations	1895	1046	861	869	668

Table III.1.4(2), continued

	OC 21	OC 22	OC 23	OC 24	OC 25
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.50719 (0.10785)	0.10700 (0.05916)	0.47939 (0.06072)	0.22770 (0.04947)	0.01985 (0.03317)
(AGE/10) SQ	-0.11403 (0.02502)	-0.01369 (0.01288)	-0.08129 (0.01374)	-0.03365 (0.01157)	0.00616 (0.00781)
(AGE/10) CUBED	0.00782 (0.00185)	0.00001 (0.00089)	0.00368 (0.00098)	0.00089 (0.00085)	-0.00139 (0.00059)
YRS OF SCH (S)	-0.00656 (0.00608)	-0.00194 (0.00324)	-0.00501 (0.00438)	-0.00351 (0.00318)	0.00260 (0.00321)
DUMMY S GE 8					0.03443 (0.02841)
D(S GE 8) * S					-0.00254 (0.00382)
DUMMY S GE 12	-0.00188 (0.08823)	-0.02218 (0.04714)	0.13606 (0.06044)	0.12308 (0.04671)	0.01801 (0.03397)
D(S GE 12) * S	0.00093 (0.00791)	0.00251 (0.00426)	-0.00779 (0.00546)	-0.00727 (0.00420)	0.00006 (0.00301)
DUMMY S GE 16	0.41548 (0.48152)	0.10323 (0.22761)	-0.43109 (0.28849)	0.83030 (0.39615)	-0.53563 (0.18730)
D(S GE 16) * S	-0.02490 (0.03001)	-0.00741 (0.01417)	0.02868 (0.01797)	-0.04844 (0.02461)	0.03450 (0.01148)
DUMMY S GE 18	0.01107 (0.06192)	0.02723 (0.02803)	-0.04861 (0.03736)	0.11659 (0.05077)	
SELF-EMPLOYED	0.21431 (0.01560)	0.09615 (0.00596)	0.03845 (0.00976)		0.00076 (0.00559)
STATE-LOCAL GOVT				-0.03080 (0.00885)	-0.02226 (0.00591)
FEDERAL GOVT				-0.02750 (0.00656)	
SINGLE	-0.08393 (0.02243)	-0.03820 (0.01275)	-0.11755 (0.01361)	-0.07902 (0.00888)	-0.04665 (0.00670)
DIVORCED	-0.01368 (0.02610)	0.00756 (0.01495)	-0.03430 (0.01700)	-0.01732 (0.01386)	-0.01337 (0.00812)
WIDOWED					
ALL CHILD < 6	-0.01329 (0.01545)	-0.00508 (0.00783)	-0.00478 (0.00961)	-0.01637 (0.00751)	-0.01364 (0.00457)
CHILD <6 & 6-17	-0.02599 (0.01838)	-0.00374 (0.01001)	0.01223 (0.01147)	0.00570 (0.00964)	-0.00320 (0.00551)
ALL CHILD 6-17	0.00982 (0.01716)	-0.00327 (0.00889)	0.00861 (0.01179)	0.02021 (0.01065)	-0.00329 (0.00524)
# OF CHILD < 6					
# OF CHILD 6-17	0.00131 (0.00556)	0.00118 (0.00290)	-0.00534 (0.00342)	-0.01037 (0.00298)	-0.00129 (0.00157)
D(POSTSEC CHILD)	-0.03188 (0.04314)	0.01245 (0.02140)	-0.07707 (0.02891)	-0.02950 (0.02871)	0.01914 (0.02126)
# POSTSEC CHILD	0.01237 (0.03500)	-0.01114 (0.01694)	0.02648 (0.02369)	-0.01519 (0.02422)	-0.01545 (0.01843)
D(SPOUSE EARN>0)	0.07852 (0.07046)	-0.09369 (0.03947)	0.07852 (0.04688)	-0.01265 (0.04085)	0.03699 (0.02391)
LN(SPOUSE HOURS)	0.03949 (0.01778)	0.05285 (0.00891)	0.01002 (0.01170)	0.01196 (0.01013)	0.00292 (0.00605)
LN(SPOUSE EARN)	-0.02708 (0.00922)	-0.01116 (0.00509)	-0.01419 (0.00596)	-0.00511 (0.00530)	-0.00641 (0.00312)
INTERCEPT (1971)	0.26955 (0.16794)	0.70749 (0.09208)	0.07499 (0.09800)	0.40734 (0.07583)	0.65527 (0.04903)
D(1972)	0.02478 (0.01284)	-0.00286 (0.00672)	0.00614 (0.00837)	0.01278 (0.00680)	0.00612 (0.00398)
D(1973)	-0.00572 (0.01301)	-0.00216 (0.00674)	0.00344 (0.00842)	0.00417 (0.00693)	0.00060 (0.00401)
D(1974)	-0.00428 (0.01326)	-0.01981 (0.00688)	-0.00141 (0.00865)	-0.00511 (0.00711)	-0.02269 (0.00416)
R Squared	0.12129	0.04407	0.12482	0.08957	0.02462
F Statistic F d.f.	14.75800 (24, 2566)	20.37500 (24,10606)	36.26800 (24, 6103)	23.66300 (25, 6013)	20.21200 (26,20817)
Standard Error	0.23401	0.24568	0.23484	0.19211	0.20662
Observations	2591	10631	6128	6039	20844

Table III.1.4(2), concluded

	OC 26	OC 27	OC 28	OC 29	OC 30
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.20368	0.16416	0.44246	0.62802	0.57436
	(0.04300)	(0.08125)	(0.06270)	(0.12049)	(0.06229)
(AGE/10) SQ	-0.03501	-0.01500	-0.08592	-0.11054	-0.10672
	(0.01066)	(0.01962)	(0.01539)	(0.02767)	(0.01474)
(AGE/10) CUBED	0.00159	-0.00061	0.00505	0.00527	0.00565
	(0.00084)	(0.00151)	(0.00119)	(0.00199)	(0.00110)
YRS OF SCH (S)	0.00345	0.00658	0.00117	0;00401	0.00521
	(0.00283)	(0.00657)	(0.00450)	(0.00780)	(0.00547)
DUMMY S GE 8	0.10891	-0.05372	0.09136	0.08928	0.12567
	(0.03028)	(0.05962)	(0.05003)	(0.12937)	(0.05480)
D(S GE 8) * S	-0.01144	0.00388	-0.01042	-0.00831	-0.01537
	(0.00386)	(0.00791)	(0.00629)	(0.01499)	(0.00720)
DUMMY S GE 12	0.07721	0.17918	0.35444	0.63006	0.21563
	(0.05057)	(0.07070)	(0.07924)	(0.23975)	(0.07029)
D(S GE 12) * S	-0.00266	-0.01445	-0.02134	-0.04249	-0.01179
	(0.00439)	(0.00628)	(0.00687)	(0.02079)	(0.00627)
DUMMY S GE 16	0.05467		-1.82689	0.05933	-0.33586
	(0.30878)		(0.53553)	(0.74576)	(0.31532)
D(S GE 16) * S	-0.00121		0.12135	0.00290	0.02531
	(0.01886)		(0.03287)	(0.04653)	(0.01923)
DUMMY S GE 18					
SELF-EMPLOYED		0.02513			0.10747
		(0.01432)			(0.01505)
STATE-LOCAL GOVT		-0.07670	0.02424	-0.13671	0.03600
		(0.01282)	(0.01073)	(0.04611)	(0.00734)
FEDERAL GOVT					
SINGLE	-0.06572	-0.07410	-0.06463	-0.07667	-0.09206
	(0.00767)	(0.01504)	(0.01219)	(0.03230)	(0.01266)
DIVORCED	-0.02302	-0.01136	-0.01864	-0.16199	-0.03677
	(0.01068)	(0.01750)	(0.01854)	(0.04901)	(0.01713)
WIDOWED					
ALL CHILD < 6	-0.01229	0.00275	0.00425	0.03033	-0.01319
	(0.00605)	(0.01049)	(0.01031)	(0.02778)	(0.00987)
CHILD <6 & 6-17	0.00214	0.03165	0.02007	0.03939	0.03358
	(0.00721)	(0.01292)	(0.01331)	(0.03525)	(0.01351)
ALL CHILD 6-17	0.00907	0.01799	-0.00378	0.00450	0.01905
	(0.00765)	(0.01220)	(0.01418)	(0.03542)	(0.01383)
# OF CHILD < 6					
# OF CHILD 6-17	-0.00583	0.00502	-0.00765	0.00235	-0.01043
	(0.00214)	(0.00352)	(0.00361)	(0.00852)	(0.00367)
D(POSTSEC CHILD)	0.02389	0.04230	-0.10115	0.09023	-0.02675
	(0.03335)	(0.06241)	(0.04339)	(0.13944)	(0.04177)
# POSTSEC CHILD	-0.03802	-0.06498	0.02263	-0.20732	-0.04169
	(0.02895)	(0.05521)	(0.03496)	(0.11506)	(0.03424)
D(SPOUSE EARN>0)	0.05092	0.04602	-0.03612	-0.33697	-0.04982
	(0.03357)	(0.05431)	(0.06665)	(0.16813)	(0.06017)
LN(SPOUSE HOURS)	0.01779	0.03888	0.04400	0.05651	0.01438
	(0.00863)	(0.01392)	(0.01682)	(0.04251)	(0.01492)
LN(SPOUSE EARN)	-0.01521	-0.02329	-0.01422	0.01071	-0.00152
	(0.00412)	(0.00698)	(0.00785)	(0.02110)	(0.00741)
INTERCEPT (1971)	0.40519	0.41419	0.01882	-0.16567	-0.13541
	(0.05831)	(0.11549)	(0.08575)	(0.17310)	(0.09050)
D(1972)	0.01187	-0.01217	0.00651	0.01677	-0.00334
	(0.00542)	(0.00933)	(0.00995)	(0.02621)	(0.00938)
D(1973)	0.00875	-0.01680	0.00099	0.02787	-0.01552
	(0.00550)	(0.00944)	(0.00973)	(0.02557)	(0.00932)
D(1974)	-0.04004	-0.03066	-0.01024	-0.00475	-0.01113
	(0.00570)	(0.00968)	(0.01010)	(0.02662)	(0.00946)
R Squared	0.05387	0.06398	0.13776	0.16188	0.17111
F Statistic	24.89800	14.65600	27.80700	8.87680	45.21600
F d.f.	(24,10495)	(24, 5146)	(25, 4351)	(25, 1149)	(26, 5695)
Standard Error	0.20106	0.24219	0.23081	0.31427	0.25094
Observations	10520	5171	4377	1175	5722

Table III.1.4(3)
Hours Functions, 1975-78

	OC 01	OC 02	OC 03	OC 04	OC 05
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.14397	0.19448	0.02488	0.30769	0.38290
	(0.09561)	(0.43228)	(0.24509)	(0.08669)	(0.17919)
(AGE/10) SQ	-0.02007	-0.03376	0.01804	-0.06592	-0.06218
	(0.02128)	(0.10124)	(0.06496)	(0.01968)	(0.03615)
(AGE/10) CUBED	0.00044	0.00188	-0.00314	0.00437	0.00272
	(0.00151)	(0.00763)	(0.00554)	(0.00144)	(0.00231)
YRS OF SCH (S)	0.00004	0.01826	-0.00141	-0.00677	-0.01869
	(0.00454)	(0.01905)	(0.00585)	(0.00285)	(0.01363)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12					
D(S GE 12) * S					
DUMMY S GE 16	-0.21100	1.14957	-0.11204	-0.06729	
	(0.22867)	(0.58295)	(0.32787)	(0.14558)	
D(S GE 16) * S	0.01484	-0.07017	0.00672	0.00561	
	(0.01436)	(0.03686)	(0.02045)	(0.00912)	
DUMMY S GE 18	-0.02374	0.08741	-0.02119	0.01197	0.09603
	(0.02789)	(0.05608)	(0.03790)	(0.01716)	(0.04458)
SELF-EMPLOYED	0.04663	0.09903			0.04174
	(0.01160)	(0.02836)			(0.01650)
STATE-LOCAL GOVT	-0.07562	-0.04913	-0.03697	-0.03727	-0.06318
	(0.01327)	(0.04807)	(0.01727)	(0.00966)	(0.02176)
FEDERAL GOVT	-0.04540	-0.03445	-0.02152	-0.04544	-0.05600
	(0.01523)	(0.05582)	(0.01818)	(0.00903)	(0.02933)
SINGLE	-0.02893	-0.03162	-0.01069	-0.02697	-0.03726
	(0.01504)	(0.05195)	(0.02030)	(0.01168)	(0.02774)
DIVORCED	0.03014	0.04485	-0.00741	-0.01581	-0.03567
	(0.02024)	(0.05775)	(0.02479)	(0.01338)	(0.03420)
WIDOWED	0.06192				
	(0.04133)				
ALL CHILD < 6	0.00940	0.04639	0.01435	0.00240	0.01005
	(0.02468)	(0.06929)	(0.02981)	(0.01871)	(0.03916)
CHILD <6 & 6-17	-0.00413	0.08030	0.02690	-0.01119	-0.06167
	(0.02513)	(0.08259)	(0.02982)	(0.01768)	(0.04187)
ALL CHILD 6-17	0.01082	-0.00453	0.01103	-0.00528	0.00740
	(0.01597)	(0.04707)	(0.02341)	(0.00978)	(0.02956)
# OF CHILD < 6	0.00116	-0.02414	-0.00664	-0.00203	0.02975
	(0.01378)	(0.04312)	(0.01662)	(0.01095)	(0.02076)
# OF CHILD 6-17	0.00063	0.00068	-0.00523	0.00268	0.01060
	(0.00679)	(0.02108)	(0.00845)	(0.00391)	(0.01182)
D(POSTSEC CHILD)	-0.00551	0.12188	0.09721	0.01304	0.00496
	(0.03300)	(0.11532)	(0.06858)	(0.01872)	(0.04299)
# POSTSEC CHILD	0.02510	-0.08350	-0.12439	-0.01561	-0.00429
	(0.02457)	(0.08676)	(0.05635)	(0.01384)	(0.02741)
D(SPOUSE EARN>0)	-0.02572	0.04278	-0.00022	-0.00552	-0.03404
	(0.04676)	(0.10434)	(0.05562)	(0.02534)	(0.07241)
LN(SPOUSE HOURS)	0.00325	-0.03858	-0.00528	-0.00460	0.05631
	(0.01488)	(0.04367)	(0.01921)	(0.00843)	(0.02243)
LN(SPOUSE EARN)	-0.00062	0.01098	-0.00007	0.00062	-0.01828
	(0.00593)	(0.01755)	(0.00819)	(0.00383)	(0.01103)
INTERCEPT (1975)	0.50129	0.08525	0.62896	0.44093	0.44450
	(0.15123)	(0.66527)	(0.30681)	(0.12586)	(0.34957)
D(1976)	-0.00041	0.07269	0.01119	0.01358	-0.02596
	(0.01105)	(0.03390)	(0.01512)	(0.00731)	(0.01982)
D(1977)	0.01219	0.07211	0.00742	0.00996	-0.06081
	(0.01096)	(0.03536)	(0.01472)	(0.00737)	(0.01929)
D(1978)	0.00717	0.04594	0.02061	-0.00055	-0.02058
	(0.01079)	(0.03140)	(0.01430)	(0.00734)	(0.01963)
R Squared	0.11042	0.23603	0.06549	0.03182	0.12518
F Statistic	6.88890	1.91550	2.03240	4.07980	5.91030
F d.f.	(26, 1443)	(25, 155)	(24, 696)	(24, 2979)	(23, 950)
Standard Error	0.14442	0.14434	0.13544	0.13798	0.20522
Observations	1470	181	721	3004	974

Table III.1.4(3), continued

	OC 06	OC 07	OC 08	OC 09	OC 10
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.44137 (0.36452)	0.02004 (0.29802)	1.20828 (0.24020)	0.25400 (0.07932)	0.58084 (0.17627)
(AGE/10) SQ	-0.06996 (0.08564)	0.01003 (0.07170)	-0.25325 (0.05761)	-0.04841 (0.01952)	-0.10378 (0.03641)
(AGE/10) CUBED	0.00272 (0.00648)	-0.00183 (0.00555)	0.01674 (0.00443)	0.00270 (0.00154)	0.00530 (0.00237)
YRS OF SCH (S)	0.00615 (0.01963)	-0.00471 (0.00797)	-0.00939 (0.00911)	0.01381 (0.01057)	-0.00125 (0.01217)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12				0.19041 (0.11477)	
D(S GE 12) * S				-0.01927 (0.01096)	
DUMMY S GE 16	0.80378 (0.62016)	-0.51468 (0.43811)	-0.06084 (0.43797)	0.42357 (0.35834)	-0.59921 (0.49031)
D(S GE 16) * S	-0.04838 (0.03930)	0.03282 (0.02738)	0.00804 (0.02745)	-0.02568 (0.02210)	0.03708 (0.03065)
DUMMY S GE 18	0.05793 (0.05988)	0.00444 (0.04981)	-0.01429 (0.04829)	-0.01968 (0.04372)	-0.14223 (0.04905)
SELF-EMPLOYED	-0.02329 (0.03664)			0.06206 (0.02462)	0.05466 (0.01969)
STATE-LOCAL GOVT	-0.04232 (0.02185)	-0.04853 (0.02990)	-0.03679 (0.01860)	-0.04990 (0.01031)	-0.00100 (0.02718)
FEDERAL GOVT	-0.03039 (0.03051)	-0.03510 (0.01882)	-0.00356 (0.01924)	-0.02182 (0.01000)	
SINGLE	-0.05910 (0.03542)	-0.06238 (0.03014)	-0.03231 (0.02893)	-0.03503 (0.01210)	-0.10534 (0.03432)
DIVORCED	-0.04547 (0.04410)	-0.01985 (0.04322)	-0.03320 (0.03931)	-0.01013 (0.01526)	0.02151 (0.04177)
WIDOWED					
ALL CHILD < 6	-0.11806 (0.05673)	0.02502 (0.04618)	-0.06043 (0.05003)	0.01375 (0.01962)	-0.00851 (0.04573)
CHILD <6 & 6-17	-0.05029 (0.05740)	-0.04865 (0.04591)	-0.04554 (0.05082)	0.00795 (0.01987)	-0.02707 (0.04821)
ALL CHILD 6-17	0.01403 (0.04278)	-0.04621 (0.03072)	-0.01976 (0.03115)	-0.02377 (0.01225)	-0.00307 (0.03178)
# OF CHILD < 6	0.04826 (0.03126)	0.00216 (0.02709)	0.01363 (0.03030)	-0.00862 (0.01176)	0.00353 (0.02620)
# OF CHILD 6-17	-0.00824 (0.01882)	0.01722 (0.01237)	-0.00500 (0.01269)	0.00682 (0.00494)	-0.00520 (0.01286)
D(POSTSEC CHILD)	-0.00695 (0.07614)	0.00013 (0.04597)	-0.07193 (0.05134)	-0.06523 (0.03666)	-0.07881 (0.05161)
# POSTSEC CHILD	0.02342 (0.05757)	0.00660 (0.03114)	0.04965 (0.03591)	0.03715 (0.03075)	0.04465 (0.03896)
D(SPOUSE EARN>0)	0.18194 (0.09200)	-0.08792 (0.07973)	-0.04922 (0.08038)	0.04662 (0.03567)	0.04770 (0.08657)
LN(SPOUSE HOURS)	0.03203 (0.02753)	0.05654 (0.02612)	0.03580 (0.02585)	-0.01734 (0.01118)	-0.02784 (0.02407)
LN(SPOUSE EARN)	-0.03250 (0.01315)	-0.01196 (0.01141)	-0.01036 (0.01009)	0.00197 (0.00427)	0.00283 (0.01278)
INTERCEPT (1975)	-0.10511 (0.57919)	0.67887 (0.40754)	-0.92645 (0.33689)	0.25575 (0.15039)	-0.07780 (0.31791)
D(1976)	0.02036 (0.02610)	0.06041 (0.01960)	0.06060 (0.01927)	0.00637 (0.00901)	-0.02121 (0.02222)
D(1977)	-0.00460 (0.02747)	0.03270 (0.02012)	0.05601 (0.02038)	0.00030 (0.00884)	-0.02906 (0.02223)
D(1978)	0.02418 (0.02717)	0.04373 (0.01982)	0.00020 (0.01975)	0.02255 (0.00889)	-0.03230 (0.02222)
R Squared	0.11070	0.12941	0.16746	0.08456	0.10898
F Statistic F d.f.	2.10120 (25, 422)	1.76520 (24, 285)	4.38310 (24, 523)	6.29530 (27, 1840)	4.30140 (24, 844)
Standard Error	0.19065	0.12026	0.16183	0.13163	0.22104
Observations	448	310	548	1868	869

Table III.1.4(3), continued

	OC 11	OC 12	OC 13	OC 14	OC 15
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	-1.78311	-0.04679	0.18800	0.48162	1.86706
	(0.35876)	(0.25750)	(0.42003)	(0.19258)	(0.3015D)
(AGE/10) SQ	0.36849	0.05901	-0.03795	-0.08769	-0.37449
	(0.07513)	(0.05517)	(0.10976)	(0.04564)	(0.06978)
(AGE/10) CUBED	-0.02518	-0.00686	0.00146	0.00513	0.02405
	(0.00505)	(0.00376)	(0.00912)	(0.00346)	(0.00520)
YRS OF SCH (S)		-0.02637	0.00495	-0.02652	-0.02722
		(0.02262)	(0.02468)	(0.00724)	(0.0314D)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		0.22552	0.51624		
		(0.32273)	(0.32749)		
0(S GE 12) * S		-0.01362	-0.03951		
		(0.02893)	(0.02925)		
DUMMY S GE 16		-1.19994	-1.35035	-0.58748	0.97917
		(0.81890)	(1.02366)	(0.40676)	(1.21577)
0(S GE 16) * S		0.07988	0.08546	0.04202	-0.05168
		(0.05099)	(0.06356)	(0.02530)	(0.07435)
DUMMY S GE 18		-0.00651	-0.05704	-0.03545	0.14202
		(0.08305)	(0.12157)	(0.04374)	(0.08715)
SELF-EMPLOYED	0.04764	-0.00220			
	(0.02395)	(0.04083)			
STATE-LOCAL GOVT	-0.01384	-0.34027	0.01787	-0.01708	-0.02872
	(0.03349)	(0.09306)	(0.02977)	(0.0148D)	(0.02004)
FEDERAL GOVT		-0.05864	-0.08564	-0.02007	0.04595
		(0.15029)	(0.05064)	(0.02174)	(0.08D81)
SINGLE	-0.05489	0.00330	-0.16334	0.03228	-0.17709
	(0.04754)	(0.03457)	(0.04971)	(0.02459)	(0.03514)
DIVORCEO	0.02681		-0.10115	0.00857	-0.14202
	(0.05021)		(0.05930)	(0.02905)	(0.03902)
WIDOWEO					
ALL CHILD < 6	0.00122	0.03648	-0.10212	-0.00520	0.07587
	(0.05808)	(0.07726)	(0.08180)	(0.04608)	(0.05419)
CHILO <6 & 6-17	-0.05254	-0.05127	-0.03116	-0.04210	0.03961
	(0.060D2)	(0.07064)	(0.08488)	(0.04534)	(0.05675)
ALL CHILD 6-17	-0.08458	-0.01542	-0.00449	0.00927	-0.01463
	(0.0419D)	(0.04724)	(0.05724)	(0.02699)	(0.03785)
# OF CHILD < 6	0.01608	0.02004	-0.00724	0.03818	-0.06421
	(0.02969)	(0.04375)	(0.04585)	(0.02691)	(0.03042)
# OF CHILD 6-17	0.04922	0.01855	0.00249	0.00132	-0.01204
	(0.01436)	(0.01796)	(0.02732)	(0.01135)	(0.01327)
D(POSTSEC CHILD)	0.01186	0.02667	-0.10661	0.03903	0.00009
	(0.05764)	(0.07995)	(0.13553)	(0.06943)	(0.07030)
# POSTSEC CHILD	0.03265	-0.04641	0.02872	-0.09500	-0.06556
	(0.03679)	(0.05797)	(0.10764)	(0.05941)	(0.05430)
D(SPOUSE EARN>D)	-0.09776	0.20553	-0.01814	-0.10250	0.07891
	(0.11649)	(0.09230)	(0.13340)	(0.07990)	(0.07622)
LN(SPOUSE HOURS)	0.02798	-0.01558	-0.00269	0.06608	-0.01855
	(0.03303)	(0.02999)	(0.03641)	(0.02579)	(0.02489)
LN(SPOUSE EARN)	0.00384	-0.02238	-0.00369	-0.01319	-0.00569
	(0.01656)	(0.01459)	(0.01744)	(0.01065)	(0.01157)
INTERCEPT (1975)	3.79183	1.01553	0.63758	0.27077	-1.73542
	(0.54200)	(0.42626)	(0.54683)	(0.27995)	(0.61583)
D(1976)	-0.01802	0.00308	-0.05929	-0.02139	0.02731
	(0.02819)	(0.02992)	(0.03885)	(0.01955)	(0.02573)
D(1977)	0.01481	0.00861	0.02555	0.01660	0.02914
	(0.02812)	(0.03079)	(0.03588)	(0.01890)	(0.02657)
D(1978)	0.03047	-0.04721	0.05377	-0.01861	0.01811
	(0.02841)	(0.02934)	(0.03800)	(0.01909)	(0.02559)
R Squared	0.13292	0.15307	0.15882	0.08616	0.22798
F Statistic	5.92470	4.49760	2.01160	4.18380	10.6060D
F d.f.	(20, 773)	(26, 647)	(26, 277)	(24, 1065)	(24, 862)
Standard Error	0.27276	0.25700	0.20983	0.21588	0.25902
Observations	794	674	304	1090	887

Table III.1.4(3), continued

	OC 16	OC 17	OC 18	OC 19	OC 20
Dependant Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.13865 (0.12972)	0.43338 (0.16587)	-0.16274 (0.11264)	0.06087 (0.11419)	0.33702 (0.22208)
(AGE/10) SQ	-0.01644 (0.03056)	-0.07167 (0.03919)	0.05265 (0.02344)	0.00052 (0.02412)	-0.05819 (0.04936)
(AGE/10) CUBED	-0.00006 (0.00232)	0.00327 (0.00296)	-0.00494 (0.00156)	-0.00122 (0.00162)	0.00322 (0.00354)
YRS OF SCH (S)	-0.00886 (0.00752)	-0.00952 (0.01652)	0.00908 (0.00782)	-0.00209 (0.00528)	-0.00269 (0.00743)
DUMMY S GE 8					
D(S GE 8) * S					
DUMMY S GE 12		-0.09994 (0.19093)	0.17128 (0.09675)		
D(S GE 12) * S		0.01063 (0.01811)	-0.01381 (0.00913)		
DUMMY S GE 16	0.26533 (0.20763)	0.95117 (0.46587)	0.04481 (0.30147)	-0.17072 (0.33928)	-0.66988 (0.40202)
D(S GE 16) * S	-0.01238 (0.01334)	-0.05571 (0.02907)	-0.00126 (0.01878)	0.01156 (0.02121)	0.04532 (0.02481)
DUMMY S GE 18	0.03816 (0.01850)	0.04844 (0.05507)	0.06912 (0.03465)	0.00850 (0.04109)	-0.04684 (0.03662)
SELF-EMPLOYED	-0.10349 (0.04793)	0.04621 (0.01594)			
STATE-LOCAL GOVT	-0.00353 (0.01281)	-0.02280 (0.03062)	0.00560 (0.00849)		-0.03077 (0.01323)
FEDERAL GOVT	-0.06651 (0.04561)	0.00577 (0.03324)			
SINGLE	-0.05479 (0.01580)	-0.08922 (0.02420)	-0.05317 (0.01943)	-0.06247 (0.02269)	-0.02955 (0.02608)
DIVORCED	0.00122 (0.02018)	-0.08214 (0.02871)	0.01299 (0.02191)	-0.03621 (0.02671)	-0.10278 (0.03207)
WIDOWED					
ALL CHILD < 6	0.00229 (0.02257)	-0.02184 (0.04699)	-0.03130 (0.03438)	0.03990 (0.02991)	-0.02543 (0.04625)
CHILD <6 & 6-17	0.01287 (0.02239)	-0.05490 (0.05134)	-0.03139 (0.03082)	-0.00154 (0.03041)	-0.00105 (0.04028)
ALL CHILD 6-17	0.01973 (0.01651)	-0.00891 (0.02851)	0.00137 (0.01659)	0.00341 (0.02024)	0.02393 (0.02330)
# OF CHILD < 6	0.00013 (0.01248)	0.04141 (0.02947)	0.04303 (0.01973)	-0.01762 (0.01768)	0.00266 (0.02682)
# OF CHILD 6-17	-0.00956 (0.00629)	0.00280 (0.01129)	0.00780 (0.00692)	0.00582 (0.00766)	-0.00351 (0.00966)
D(POSTSEC CHILD)	-0.00751 (0.03550)	0.03551 (0.06928)	-0.02906 (0.03537)	-0.04214 (0.04760)	-0.06464 (0.04544)
# POSTSEC CHILD	-0.00460 (0.02717)	-0.07739 (0.05552)	0.00163 (0.02787)	0.03103 (0.03671)	0.04735 (0.03627)
D(SPOUSE EARN>0)	0.03051 (0.04067)	0.06296 (0.08309)	-0.00552 (0.04329)	-0.02722 (0.05192)	0.06853 (0.05007)
LN(SPOUSE HOURS)	0.03454 (0.01255)	0.00983 (0.02423)	0.02545 (0.01315)	0.01508 (0.01840)	-0.00020 (0.01631)
LN(SPOUSE EARN)	-0.01864 (0.00583)	-0.01512 (0.01006)	-0.01002 (0.00604)	-0.00779 (0.00734)	-0.01053 (0.00731)
INTERCEPT (1975)	0.65197 (0.20260)	0.08443 (0.28669)	0.77650 (0.19032)	0.66968 (0.18592)	0.24891 (0.34291)
D(1976)	-0.00852 (0.01106)	0.04370 (0.01906)	-0.00071 (0.01205)	0.01593 (0.01412)	-0.00322 (0.01595)
D(1977)	-0.02670 (0.01106)	-0.00429 (0.01919)	-0.01066 (0.01208)	0.03009 (0.01414)	-0.01779 (0.01643)
D(1978)	-0.02182 (0.01112)	0.00474 (0.01886)	0.01356 (0.01231)	0.02877 (0.01431)	-0.03036 (0.01642)
R Squared	0.03959	0.10987	0.13678	0.07637	0.09097
F Statistic F d.f.	3.74450 (25, 2271)	6.40450 (27, 1401)	7.11770 (25, 1123)	3.72480 (22, 991)	3.70700 (23, 852)
Standard Error	0.18338	0.24827	0.13702	0.15380	0.16553
Observations	2297	1429	1149	1014	876

Table III.1.4(3), continued

	OC 21	OC 22	OC 23	OC 24	OC 25
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.47155	0.12169	0.51655	0.32622	-0.01697
	(0.08312)	(0.04096)	(0.04778)	(0.04019)	(0.02522)
(AGE/10) SQ	-0.09501	-0.01432	-0.08446	-0.04906	0.01823
	(0.01920)	(0.00893)	(0.01066)	(0.00944)	(0.00607)
(AGE/10) CUBED	0.00574	-0.00012	0.00342	0.00161	-0.00246
	(0.00142)	(0.00062)	(0.00075)	(0.00070)	(0.00047)
YRS OF SCH (S)	0.00627	0.00244	-0.00366	-0.01037	0.00813
	(0.00573)	(0.00254)	(0.00464)	(0.00292)	(0.00234)
DUMMY S GE 8					0.09413
					(0.02168)
D(S GE 8) * S					-0.01163
					(0.00287)
DUMMY S GE 12	0.08786	0.01984	0.21186	0.16173	-0.03056
	(0.07704)	(0.03601)	(0.05771)	(0.03986)	(0.02405)
D(S GE 12) * S	-0.01021	-0.00314	-0.01315	-0.00847	0.00468
	(0.00705)	(0.00327)	(0.00536)	(0.00365)	(0.00217)
DUMMY S GE 16	-0.13816	0.28695	-0.11175	-0.03451	0.20220
	(0.34393)	(0.16604)	(0.11336)	(0.12037)	(0.12796)
D(S GE 16) * S	0.00892	-0.01811	0.01018	0.00656	-0.01189
	(0.02142)	(0.01035)	(0.00709)	(0.00744)	(0.00786)
DUMMY S GE 18	0.03736	0.03339			
	(0.04367)	(0.02027)			
SELF-EMPLOYED	0.15994	0.08112	0.03158		0.02317
	(0.01076)	(0.00386)	(0.00690)		(0.00362)
STATE-LOCAL GOVT				-0.02649	-0.01504
				(0.00755)	(0.00451)
FEDERAL GOVT	-0.10690			-0.01016	
	(0.03984)			(0.00528)	
SINGLE	-0.04066	-0.05397	-0.09456	-0.05805	-0.05010
	(0.01606)	(0.00870)	(0.01115)	(0.00759)	(0.00463)
DIVORCED	0.00328	-0.00557	-0.05648	-0.00338	-0.02389
	(0.01863)	(0.00910)	(0.01244)	(0.01008)	(0.00520)
WIDOWED					
ALL CHILD < 6	-0.02335	0.00644	-0.00028	0.03934	-0.00595
	(0.02737)	(0.01351)	(0.01762)	(0.01530)	(0.00680)
CHILD <6 & 6-17	-0.02975	0.02342	-0.01529	0.01721	-0.00761
	(0.02664)	(0.01253)	(0.01707)	(0.01500)	(0.00662)
ALL CHILD 6-17	-0.00704	0.00426	-0.02582	-0.01177	-0.00905
	(0.01491)	(0.00694)	(0.01008)	(0.00828)	(0.00396)
# OF CHILD < 6	0.01177	-0.00408	0.00369	-0.01569	0.00709
	(0.01696)	(0.00764)	(0.01009)	(0.00916)	(0.00373)
# OF CHILD 6-17	-0.00334	0.00121	-0.00539	-0.00825	0.00220
	(0.00617)	(0.00282)	(0.00419)	(0.00348)	(0.00153)
D(POSTSEC CHILD)	-0.00781	0.01499	-0.07048	-0.01065	-0.02636
	(0.04170)	(0.01670)	(0.02263)	(0.02047)	(0.01420)
# POSTSEC CHILD	0.00188	-0.01030	0.02208	-0.03831	0.00487
	(0.03456)	(0.01321)	(0.01766)	(0.01633)	(0.01180)
D(SPOUSE EARN>0)	-0.02464	-0.03680	0.07597	0.03936	0.00588
	(0.04132)	(0.01982)	(0.02993)	(0.02546)	(0.01265)
LN(SPOUSE HOURS)	0.03051	0.02447	0.01296	0.00809	0.01589
	(0.01259)	(0.00582)	(0.00901)	(0.00792)	(0.00384)
LN(SPOUSE EARN)	-0.01053	-0.00769	-0.01759	-0.00830	-0.00776
	(0.00533)	(0.00255)	(0.00393)	(0.00329)	(0.00155)
INTERCEPT (1975)	0.13599	0.62532	-0.01316	0.26932	0.64014
	(0.13065)	(0.06436)	(0.08438)	(0.06396)	(0.03616)
D(1976)	-0.00741	0.00166	0.00302	0.00328	0.00760
	(0.01068)	(0.00523)	(0.00733)	(0.00585)	(0.00307)
D(1977)	-0.00153	0.00207	-0.00464	0.00364	0.01160
	(0.01094)	(0.00521)	(0.00734)	(0.00596)	(0.00307)
D(1978)	-0.00208	0.00510	0.00794	0.00329	0.01225
	(0.01090)	(0.00523)	(0.00735)	(0.00594)	(0.00306)
R Squared	0.12648	0.06587	0.16579	0.16063	0.03824
F Statistic	15.93900	38.10200	57.81700	50.96400	36.79900
F d.f.	(26, 2862)	(25,13508)	(24, 6982)	(25, 6658)	(27,24991)
Standard Error	0.20054	0.20791	0.21213	0.16738	0.16592
Observations	2889	13534	7007	6684	25019

Table III.1.4(3), concluded

	OC 26	OC 27	OC 28	OC 29	OC 30
Dependent Var	LN HOURS	LN HOURS	LN HOURS	LN HOURS	LN HOURS
(AGE/10)	0.26089 (0.03139)	0.14386 (0.06093)	0.51672 (0.04826)	0.55543 (0.11614)	0.59784 (0.04588)
(AGE/10) SQ	-0.04818 (0.00782)	-0.00600 (0.01461)	-0.09695 (0.01193)	-0.10185 (0.02822)	-0.10160 (0.01089)
(AGE/10) CUBED	0.00254 (0.00062)	-0.00181 (0.00111)	0.00524 (0.00093)	0.00532 (0.00215)	0.00453 (0.00081)
YRS OF SCH (S)	0.00303 (0.00213)	0.00655 (0.00535)	-0.00418 (0.00346)	0.01495 (0.00572)	0.00108 (0.00426)
DUMMY S GE 8	0.10168 (0.02352)	0.12348 (0.04984)	0.21894 (0.04047)	0.30540 (0.10041)	0.13809 (0.04567)
D(S GE 8) * S	-0.01031 (0.00295)	-0.01228 (0.00657)	-0.02102 (0.00500)	-0.03387 (0.01140)	-0.01676 (0.00582)
DUMMY S GE 12	-0.01519 (0.02997)	0.22212 (0.05512)	0.05798 (0.05163)	0.73275 (0.17491)	0.16293 (0.05487)
D(S GE 12) * S	0.00435 (0.00270)	-0.01420 (0.00499)	0.00416 (0.00463)	-0.04705 (0.01525)	-0.00573 (0.00493)
DUMMY S GE 16				-1.42006 (0.45914)	0.04422 (0.20882)
D(S GE 16) * S				0.09623 (0.02873)	0.00165 (0.01273)
DUMMY S GE 18					
SELF-EMPLOYED		0.10167 (0.01056)	0.07452 (0.01296)	0.08338 (0.03354)	0.14719 (0.01250)
STATE-LOCAL GOVT		-0.07102 (0.01069)	0.01437 (0.00841)		0.06563 (0.00599)
FEDERAL GOVT				-0.18341 (0.03358)	
SINGLE	-0.04895 (0.00552)	-0.06397 (0.01149)	-0.07775 (0.00957)	-0.05808 (0.02501)	-0.09222 (0.01004)
DIVORCED	-0.00697 (0.00700)	-0.02821 (0.01343)	-0.03361 (0.01347)	-0.02535 (0.03905)	-0.02267 (0.01180)
WIDOWED					
ALL CHILD < 6	0.00903 (0.00860)	0.00731 (0.01711)	-0.01200 (0.01716)	0.01494 (0.03861)	0.00549 (0.01911)
CHILD <6 & 6-17	-0.00828 (0.00879)	0.00776 (0.01675)	-0.03473 (0.01749)	0.00961 (0.04102)	-0.02516 (0.01890)
ALL CHILD 6-17	-0.01621 (0.00541)	-0.01230 (0.01015)	-0.04078 (0.00964)	-0.03404 (0.02448)	-0.02433 (0.00993)
# OF CHILD < 6	-0.00660 (0.00471)	-0.00170 (0.00927)	-0.00021 (0.00993)	-0.00011 (0.01939)	0.00165 (0.01102)
# OF CHILD 6-17	-0.00078 (0.00207)	0.00062 (0.00374)	-0.00425 (0.00361)	-0.01042 (0.00801)	-0.00320 (0.00392)
D(POSTSEC CHILD)	-0.00217 (0.02362)	-0.00217 (0.03939)	-0.02175 (0.03158)	-0.10950 (0.07313)	-0.03795 (0.02555)
# POSTSEC CHILD	-0.02728 (0.02016)	-0.02350 (0.03268)	-0.07215 (0.02541)	0.04462 (0.05956)	-0.04447 (0.02016)
D(SPOUSE EARN>0)	0.04434 (0.01934)	0.05285 (0.03309)	0.03116 (0.03548)	0.12156 (0.07357)	-0.02880 (0.03469)
LN(SPOUSE HOURS)	0.00758 (0.00581)	0.01038 (0.01006)	0.01338 (0.01053)	0.02028 (0.02225)	0.01555 (0.01081)
LN(SPOUSE EARN)	-0.00893 (0.00227)	-0.01144 (0.00401)	-0.01031 (0.00419)	-0.02467 (0.00971)	-0.00375 (0.00455)
INTERCEPT (1975)	0.30526 (0.04176)	0.41122 (0.08613)	-0.03812 (0.06487)	-0.03369 (0.15333)	-0.21871 (0.06568)
D(1976)	0.00972 (0.00419)	0.01391 (0.00799)	0.00786 (0.00775)	-0.02541 (0.01986)	-0.00036 (0.00762)
D(1977)	0.01908 (0.00421)	0.01521 (0.00802)	0.00441 (0.00764)	-0.03525 (0.02035)	-0.00109 (0.00771)
D(1978)	0.02517 (0.00419)	0.00284 (0.00798)	0.00546 (0.00774)	-0.03590 (0.02035)	-0.00233 (0.00769)
R Squared	0.07043	0.10497	0.23903	0.17244	0.29523
F Statistic F d.f.	40.74500 (23, 12368)	29.99200 (25, 6393)	73.11400 (25, 5819)	13.49800 (27, 1749)	121.56000 (27, 7835)
Standard Error	0.16008	0.21752	0.20236	0.28478	0.23316
Observations	12392	6419	5845	1777	7863

It is interesting to note that for accountants, physicians and other health professionals the self employment effect is significantly positive in 1967 and 1977 but is negative or insignificant in 1972. This suggests the possibility that the Nixon Administration's program of wage and price controls impinged differentially on selfemployed professionals.

Government employment effects are more frequently significant in 1972 and 1977 than in 1967. However, an examination of the differences in state- local and federal effects in these latter two periods suggests that the relative insignificance in 1967 is due to the inability to control for level of government in this earlier period. Thus, the state- local effects are generally negative while the federal effects are, with one exception, always positive. The statistically significant percentage increments clearly indicate these effects:

	1967	1972		1977	
		S/L	FED	S/L	FED
(1) Accounts		-10%		-8%	
(3) Computer specialists		-11		-9	8%
(4) Engineers			13%	-11	12
(6) Librarians & soc. sc.		-14		-11	17
(7) Mathematical specialists			18	-19	
(8) Life & physical sc.		-13		-16	
(9) Eng. and sc. technicians		-10	15	-13	7
(10) Hlth. prof. (ex. physicians)		-26		-14	
(12) Clergy				84	92
(14) Other technicians	-14%	-22		-15	28
(15) College faculty					-21
(16) Teachers (noncollege)	11	19		17	21
(17) Writers et al.				-14	
(18) Public administrators	*	-25	0	-23	0
(20) Hlth. & ed. admin.		9			
(24) Clerical		-6	15	-8	14
(25) Crafts	-7	-9		-12	
(27) Transport operatives	-13	-18		-20	
(28) Laborers (nonfarm)	-4	-5		-9	
(29) Farm laborers	61	43			72
(30) Service	26	27		25	

Table III.1.5
Significance Tests of Explanatory Variable Groups
CPS Occupational Earnings Fundctions

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
HOURS	1967-1969	0.1%	50.3%	NE	0.0%	0.0%	0.0%	NE	0.0	0.0%	2.2%	10.1%	0.4%	3.7%	0.0%	0.0%	0.0%	0.0%	0.1%	NE	NE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	1971-1974	0.0	4.3	0.0%	0.2	0.2	0.0	64.6%	2.4	0.0	1.2	29.0	2.3	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1975-1978	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXPERIENCE	1967-1969	0.0	0.0	NE	0.0	0.0	0.0	NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NE	NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1971-1974	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1975-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HOURS-EXPERIENCE INTERACTION	1967-1969	15.9	92.3	NE	34.1	0.0	0.1	NE	2.2	0.1	2.3	93.4	26.8	16.4	0.0	68.5	1.5	9.9	0.3	NE	NE	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.3	0.0
	1971-1974	0.1	5.1	3.3	11.0	32.0	19.0	86.6	66.1	0.0	0.6	40.5	69.0	9.5	0.0	0.0	8.9	27.7	13.5	0.0	55.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	0.0
	1975-1978	21.9	19.6	0.0	13.9	0.2	0.0	16.4	88.5	0.0	0.1	0.0	54.6	54.5	0.0	0.2	0.0	0.0	0.0	1.1	92.6	1.6	0.0	0.8	5.6	0.0	0.0	0.4	98.5	5.3	2.2
SCHOOLING	1967-1969	0.0	16.3	NE	0.0	1.3	0.0	NE	0.0	0.0	0.0	0.2	2.0	4.3	0.0	0.0	0.0	0.0	0.0	NE	NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1971-1974	0.0	38.2	0.0	0.0	8.1	0.2	0.0	0.0	0.0	0.0	0.4	82.2	69.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1975-1978	0.0	5.4	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	NA	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TYPE OF EMPLOYMENT	1967-1969	4.1	96.7	NE	88.6	92.3	17.2	NE	32.4	9.4	0.1	0.6	NA	3.3	0.0	77.9	0.0	0.4	NA	NE	NE	NA	0.0	0.4	77.5	0.0	NA	0.0	5.0	0.0	0.0
	1971-1974	0.4	41.0	2.1	0.0	27.3	0.6	1.0	1.9	0.0	0.0	13.0	82.3	70.9	0.0	4.9	0.0	0.0	0.0	NA	2.5	0.0	0.0	8.4	0.0	0.0	NA	0.0	2.1	0.0	0.0
	1975-1978	0.0	49.1	0.3	0.0	7.8	0.0	5.2	0.0	0.0	0.0	0.0	0.5	30.2	0.0	1.0	0.0	0.0	0.0	NA	76.9	0.0	0.0	2.3	0.0	0.0	NA	0.0	0.0	0.0	0.0
RESIDENCE	1967-1969	0.0	51.8	NE	0.0	0.0	0.1	NE	0.0	0.0	1.3	57.0	75.3	73.1	0.0	51.7	0.0	0.0	0.0	NE	NE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
	1971-1974	5.9	0.3	17.3	0.0	68.4	0.3	10.3	0.4	0.0	97.9	32.1	18.3	0.2	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
	1975-1978	0.0	10.8	2.6	0.0	0.1	0.0	57.1	4.1	0.0	4.8	7.5	2.1	49.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
INTERCEPT SHIFTS	1967-1969	0.0	15.5	NE	0.0	3.3	36.0	NE	0.5	0.2	12.2	31.4	41.1	86.0	0.6	5.2	0.0	18.4	49.5	NE	NE	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.3	19.8
	1971-1974	3.6	49.4	42.6	0.0	76.3	56.4	73.3	36.5	85.8	9.4	47.1	25.3	8.8	27.9	42.2	0.3	12.2	32.0	22.5	86.3	50.7	0.0	20.2	22.0	0.0	0.0	0.0	0.1	0.5	1.6
	1975-1978	18.5	96.1	61.3	53.8	27.9	35.2	12.8	58.4	13.2	16.7	21.3	17.2	39.8	63.2	29.5	0.0	33.4	26.7	5.0	28.8	24.9	0.4	0.8	80.3	0.0	0.0	0.1	0.2	5.5	18.7

NE: Not Estimated
NA: Not Applicable (0 Variable)

Table III.1.6
Significance Tests of Explanatory Variable Groups
CPS Occupational Hours Functions

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
AGE	1967-1969	0.0%	NE	NE	66.8%	0.0%	0.0%	NE	32.1%	2.7%	0.0%	0.0%	0.0%	7.6%	0.0%	0.1%	54.5%	0.1%	54.0%	NE	NE	11.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	1971-1974	49.5	58.0%	3.2%	0.1	0.0	27.6	36.8	16.9	21.5	0.1	0.0	0.0	3.4	0.0	0.0	1.3	5.5	9.6	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1975-1979	0.0	59.4	0.2	0.0	0.0	0.2	29.2	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0		0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SCHOOLING	1967-1969	36.4	NE	NE	52.2	8.4	62.0	NE	91.6	21.3	0.9	0.4	0.1	12.0	13.9	43.1	0.0	8.5	45.3	NE	NE	46.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0
	1971-1974	0.9	25.6	37.3	79.0	0.1	11.9	41.7	98.1	2.8	0.2	0.0	5.9	64.1	90.2	0.1	0.0	1.4	1.9	29.4	2.9	23.4	37.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1975-1979	1.2	24.4	78.9	6.7	8.3	63.3	5.5	33.7	0.0	0.0	NA	1.5	13.0	0.6	15.4	2.2	0.6	0.0	26.3	0.0	9.9	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TYPE OF EMPLOYER	1967-1969	0.0	NE	NE	0.0	0.0	13.2	NE	43.9	0.0	23.9	0.1	NA	94.1	0.0	22.3	34.9	49.5	NA	NE	NE	NA	0.0	0.0	0.0	0.0	NA	0.0	13.9	0.0	0.0
	1971-1974	0.0	50.3	0.0	0.0	0.0	2.2	21.3	0.0	0.1	40.0	0.0	11.9	31.7	1.4	59.0	70.4	17.3	1.4	NA	0.2	0.6	0.2	0.0	0.0	0.1	NA	0.0	2.4	0.3	0.0
	1975-1979	0.0	0.0	6.1	0.0	0.0	27.7	7.3	13.7	0.0	1.4	6.7	0.4	15.6	43.7	25.1	9.1	2.1	50.9	NA	2.0	0.0	0.0	0.0	0.1	0.0	NA	0.0	0.0	0.0	0.0
MARITAL STATUS	1967-1969	0.3	NE	NE	9.8	2.0	27.8	NE	20.9	0.1	1.1	17.0	14.5	31.5	17.8	9.9	3.9	12.3	39.9	NE	NE	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0
	1971-1974	0.5	72.7	10.5	54.3	0.0	10.0	85.4	34.0	6.9	29.5	17.5	76.3	67.1	56.9	36.1	69.1	41.0	57.1	5.9	27.9	0.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
	1975-1979	1.4	45.9	86.7	5.6	31.8	22.8	11.9	47.7	1.5	0.3	34.1	92.4	0.5	41.5	0.0	0.1	0.0	1.1	1.7	0.9	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7	0.0
POSTSECONDARY CHILD	1967-1969	78.3	NE	NE	42.9	38.8	0.0	NE	40.9	0.0	25.5	97.6	30.3	9.9	0.0	24.8	82.7	9.9	37.8	NE	NE	0.2	50.3	0.0	0.0	28.7	12.5	0.0	0.0	84.3	0.0
	1971-1974	50.9	99.9	1.8	8.5	8.1	57.8	5.6	7.0	17.8	86.1	9.0	29.1	1.1	0.2	0.3	10.2	98.2	14.1	26.3	40.9	50.9	80.3	0.0	0.0	66.5	8.2	12.9	0.0	0.1	0.0
	1975-1979	10.4	57.3	1.1	38.9	98.7	74.0	92.7	36.1	6.9	26.9	9.0	46.4	26.9	0.3	0.6	94.9	4.2	8.6	87.5	36.3	91.9	66.1	0.0	0.0	0.0	0.0	7.4	0.0	9.8	0.0
CHILDREN	1967-1969	73.0	NE	NE	1.3	38.2	2.5	NE	94.6	47.0	9.1	19.9	11.5	15.3	53.9	47.4	1.1	24.1	57.3	NE	NE	1.2	87.0	30.3	0.2	0.9	0.1	80.4		7.4	25.5
	1971-1974	25.8	11.7	14.1	11.9	88.1	82.9	92.1	45.3	35.4	90.0	79.1	9.3	95.7	53.0	23.6	2.3	4.2	25.1	0.6	21.6	29.3	83.8	37.3	1.0	3.4	7.8	1.5	0.4	72.8	0.3
	1975-1979	88.3	97.8	96.2	90.3	8.4	43.8	35.5	56.8	27.9	93.9	2.3	50.8	15.0	21.7	9.3	78.9	57.0	9.3	38.4	57.0	82.5	9.8	0.0	0.0	1.1	0.0	39.3	0.0	0.8	0.0
SPOUSE EMPLOYED	1967-1969	11.2	NE	NE	79.2	79.4	74.1	NE	47.0	9.9	8.1	77.8	7.7	91.2	2.2	40.4	0.1	0.0	2.0	NE	NE	12.2	0.0	7.0	0.3	26.8	8.3	0.1	8.5	50.4	30.9
	1971-1974	94.7	58.1	9.3	42.0	96.0	29.5	80.3	66.0	75.2	35.3	1.8	12.4	26.6	70.4	2.2	8.1	8.3	0.6	9.2	24.0	1.9	0.0	11.2	7.5	8.3	0.0	0.3	5.8	3.5	34.8
	1975-1979	19.1	84.3	53.2	4.7	9.7	7.3	17.9	42.4	41.4	45.1	51.3	8.3	46.3	6.0	27.6	0.9	15.1	24.2	0.3	10.9	7.0	0.0	0.0	9.2	0.0	0.1	3.4	8.9	7.8	40.9
INTERCEPT SHIFTS	1967-1969	36.4	NE	NE	1.0	96.5	72.9	NE	24.9	3.7	29.5	3.7	18.6	29.1	88.9	22.6	23.2	20.5	92.4	NE	NE	11.0	92.5	9.8	5.9	0.4	13.0	40.5	5.9	21.3	42.7
	1971-1974	42.9	7.8	2.1	37.2	34.1	52.5	90.6	22.4	23.2	95.7	11.8	95.3	94.1	31.9	9.0	66.4	29.8	97.5	52.2	84.1	8.4	1.4	91.2	7.5	0.0	0.0	1.7	42.1	56.5	33.0
	1975-1979	59.3	12.8	53.4	11.3	1.2	60.4	1.9	0.1	2.7	48.2	32.7	13.4	1.6	12.7	67.9	9.2	4.0	19.9	12.6	20.9	90.2	79.5	34.3	92.2	0.0	0.0	12.1	78.5	27.2	99.0

NE: Not Estimated
NA: Not Applicable (Ø Variable)

Thus, with the exception of college teachers, federal employment is associated with positive earnings increments. In contrast, apart from noncollege teachers, health and education administrators, farm laborers and service workers, the state- local earnings increment is negative. It should be noted that, because all public administrators work for some level of government, no government employment variable was included in the 1967 earnings function for this occupation. In later years, the federal employment variable was excluded; thus, the coefficients on the state- local employment variable represent the relative gain (actually, loss) associated with state- local relative to federal employment, a striking negative value in excess of 20 percent.

Earnings increments associated with SMSA residence are almost always significant and positive, as the following tabulation of percentage gains indicates:

	1967	1972	1977		1967	1972	1977
(1) Accountants	15%	9%	12%	(16) Oth. teachers	12%	18%	19%
(2) Architects	9	37	3	(17) Writers, et al.	28	23	21
(3) Computer spec.		1	8	(18) Public admin.	20	22	14
(4) Engineers	13	11	7	(19) Bank officers		15	15
(5) Lawyers	43	4	17	(20) Hlth & ed admin.		22	21
(6) Librar., soc. sc.	34	23	22	(21) Managers (trade)	24	14	15
(7) Math spec.		10	-0	(22) Oth. manag. & ad.	24	25	19
(8) Life & phy. sc.	13	11	5	(23) Sales	29	23	20
(9) Eng. & sc. tech.	11	12	6	(24) Clerical	15	12	10
(10) Hlth prof.	22	0	10	(25) Crafts	19	19	15
(11) Physicians	6	11	8	(26) Operatives	18	13	11
(12) Clergy	4	10	9	(27) Trans. oper.	28	18	16
(13) Hlth. tech.	4	31	-2	(28) Laborers (ex farm)	14	21	18
(14) Oth. tech.	25	21	18	(29) Farm laborers	16	14	22
(15) College faculty	5	12	16	(30) Service	22	21	15

In contrast, the coefficient of the central city dummy variable is almost always negative, generally significantly so, entailing earnings losses which commonly offset between one- and two- thirds of the gain associated with SMSA residence:

	1967	1972	1977		1967	1972	1977
(1) Accountants	-5%	-2%	-3%	(16) Oth. teachers	-1%	-9%	-7%
(2) Architects	-14	20	-17	(17) Writers, et al.	-13	-11	-7
(3) Computer spec.		-2	-7	(18) Public admin.	-12	-4	1
(4) Engineers	-7	-4	-7	(19) Bank officers		-0	-8
(5) Lawyers	-16	-4	-7	(20) Hlth & ed admin.		-5	-6
(6) Librar., soc. sc.	-15	-16	-6	(21) Managers (trade)	-16	-6	-10
(7) Math spec.		-8	-5	(22) Oth. manag. & ad.	-7	-10	-6
(8) Life & phy. sc.	-16	-13	-11	(23) Sales	-6	-8	-6
(9) Eng. & sc. tech.	-9	-6	-3	(24) Clerical	-7	-6	-6
(10) Hlth prof.	-6	1	-4	(25) Crafts	-6	-8	-7
(11) Physicians	-7	-0	2	(26) Operatives	-7	-6	-6
(12) Clergy	-6	3	7	(27) Trans. oper.	-10	-6	-8
(13) Hlth. tech.	-6	-11	-3	(28) Laborers (ex farm)	-0	-2	-9
(14) Oth. tech.	-9	-17	-13	(29) Farm laborers	0	-6	-7
(15) College faculty	-0	-3	0	(30) Service	-2	-3	-4

In general, it would appear that the tendancy has been for the SMSA- nonSMSA differential to narrow over time, although there are occupational exceptions, while the central- city differential (negative) has remained substantial in many occupations.

The final set of earnings function variables involve schooling. As a group these variables are highly significant for virtually all occupations for which the variance of schooling is nontrivial. Because of the number of schooling variables and the resultant extreme nonlinearity of the earnings-schooling relationship, it is effectively impossible to interpret the coefficients on the individual schooling variables. Instead, Table III.1.7 presents ratios of predicted earnings at each year of schooling (from eight through 18 or greater) to predicted earnings with 16 years of schooling, by year and occupation. Several patterns are observed in this relationships. On the one hand, earnings commonly shift upward abruptly at the critical points of 12, 16 and 18+ years of schooling. On the other, over some ranges earnings rise monotonically with increases in years of schooling. While abrupt shifts may be the result of a number of factors, many of which are not inconsistent

with general human capital models of the schooling- earnings relationship, as a short- hand reference it is convenient to characterize these shifts as "credentialing" effects. The more continuous relationships, similarly, can be characterized as "rate- of- return" effects.

Denoting the credentialling effects at 12, 16 and 18+ years by C12, C16 and C18, respectively, and the rate of return effects over the ranges 8 to 12, 12 to 16 and 16 to 18 years by R8-12, R12-16 and R16-18, respectively, the following patterns emerge:

(1) Accountants	C12(1967), C16, C18(declining), R16-18(1972, 1977)
(2) Architects	C16
(3) Computer spec.	C16, R16-18
(4) Engineers	C16, R16-18
(5) Lawyers	C16(1967), C18(1972, 1977)
(6) Librarians, soc. sc.	C12(1967), C16, R12-18
(7) Math. spec.	C16, C18
(8) Life, phy. sc.	C16, R12-16, R16-18(declining)
(9) Eng. & sc. tech.	R8-16
(10) Hlth. prof.	C12, R12-16, R16-18(1977)
(11) Physicians	[Insufficient variance for analyses]
(12) Clergy	[Erratic]
(13) Hlth. tech.	C12(1977), C18(1967), R12-17(1977)
(14) Oth. tech.	C12(declining), C16, R12-18
(15) College faculty	C16, C18
(16) Oth. teachers	C16, R16-18
(17) Writers et al.	C12(rising), C16
(18) Public admin.	C12(declining), C16, R12-18
(19) Bank officers	C16, R12-16(1972), R16-18
(20) Hlth. & ed. admin.	C16, C18
(21) Managers (trade)	C16, R12-16, R16-18(1967, 1977)
(22) Oth. manag. & admin.	C12, C16, R12-18
(23) Sales	C12, C16, R12-16
(24) Clerical	C12, C16, R12-18
(25) Crafts	C12, R12-18
(26) Operatives	C12
(27) Transport operatives	R8-12(1967, 1972), R8-18(1977)
(28) Laborers (nonfarm)	C12, negative C16(1972), R8-18
(29) Farm laborers	C12, C16, R16-18(1972, 1977)
(30) Service	C12, R12-16(1972, 1977)

In summary terms, earnings generally rise with levels of schooling, but credentialling effects predominate, in both professional and nonprofessional occupations.

Table III.1.7
Indices of Occupational Earnings by Years if School Completed
(Earnings at 16 Years of School=1.00)

OC 1	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.774	0.749	0.724	0.700	0.818	0.822	0.826	0.830	1.000	1.014	1.257	940
1972	0.700	0.712	0.724	0.736	0.748	0.761	0.773	0.786	1.000	1.108	1.233	1305
1977	0.777	0.776	0.775	0.774	0.773	0.772	0.771	0.769	1.000	1.108	1.135	1470

OC 2	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.834	0.827	0.821	0.814	0.808	0.801	0.795	0.789	1.000	1.153	1.100	80
1972	0.715	0.712	0.709	0.705	0.866	0.852	0.838	0.825	1.000	0.895	1.146	147
1977	0.488	0.522	0.558	0.597	0.638	0.683	0.730	0.781	1.000	0.992	0.981	181

OC 3	8	9	10	11	12	13	14	15	16	17	18	NOB
1972	0.700	0.723	0.747	0.772	0.798	0.824	0.852	0.880	1.000	1.123	1.205	520
1977	0.646	0.679	0.713	0.750	0.788	0.829	0.871	0.916	1.000	1.096	1.105	721

OC 4	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.664	0.691	0.720	0.750	0.781	0.813	0.847	0.882	1.000	1.047	1.140	2357
1972	0.756	0.772	0.789	0.806	0.823	0.841	0.859	0.878	1.000	1.090	1.133	2429
1977	0.713	0.733	0.754	0.775	0.797	0.820	0.843	0.867	1.000	1.056	1.150	3004

OC 5	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.518	0.555	0.596	0.639	0.685	0.735	0.789	0.846	1.000	0.936	0.954	496
1972	0.808	0.823	0.838	0.854	0.870	0.886	0.903	0.920	1.000	1.071	1.164	734
1977	0.959	0.964	0.969	0.974	0.979	0.984	0.990	0.995	1.000	1.005	1.254	974

OC 6	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.642	0.556	0.482	0.418	0.647	0.702	0.762	0.827	1.000	1.163	1.051	168
1972	0.965	0.935	0.905	0.877	0.850	0.823	0.797	0.772	1.000	1.041	1.113	308
1977	0.555	0.590	0.628	0.668	0.711	0.757	0.805	0.857	1.000	1.052	1.153	448

OC 7	8	9	10	11	12	13	14	15	16	17	18	NOB
1972	0.837	0.780	0.726	0.676	0.693	0.732	0.773	0.816	1.000	0.870	1.109	286
1977	0.700	0.722	0.744	0.767	0.791	0.816	0.841	0.867	1.000	1.113	1.233	310

OC 8	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.643	0.673	0.705	0.738	0.773	0.809	0.847	0.886	1.000	1.086	1.166	379
1972	0.728	0.732	0.737	0.742	0.747	0.752	0.757	0.763	1.000	1.073	1.127	440
1977	0.572	0.611	0.653	0.698	0.746	0.797	0.852	0.911	1.000	1.073	1.057	548

OC 9	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.651	0.697	0.747	0.800	0.821	0.866	0.914	0.965	1.000	0.993	0.987	1360
1972	0.821	0.845	0.869	0.894	0.904	0.939	0.975	1.012	1.000	1.269	0.973	1633
1977	0.823	0.837	0.850	0.863	0.930	0.957	0.985	1.014	1.000	1.033	1.085	1868

OC10	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.381	0.431	0.487	0.550	0.622	0.703	0.795	0.898	1.000	0.805	1.064	447
1972	1.325	0.862	0.561	0.365	0.668	0.774	0.897	1.040	1.000	1.123	1.349	686
1977	0.472	0.507	0.545	0.586	0.630	0.677	0.728	0.782	1.000	1.253	1.333	869

OC11	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.288	0.337	0.393	0.459	0.537	0.627	0.733	0.856	1.000	1.168	1.163	437
1972	1.068	1.059	1.050	1.042	1.033	1.025	1.017	1.008	1.000	0.992	1.613	601
1977	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	794

OC12	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.844	0.875	0.908	0.942	1.016	1.123	1.241	1.371	1.000	1.202	1.208	403
1972	1.164	1.215	1.268	1.323	0.968	0.989	1.010	1.032	1.000	0.985	1.034	503
1977	1.100	1.071	1.042	1.014	1.124	1.013	0.912	0.822	1.000	1.021	1.062	674

OC 13	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.925	0.909	0.893	0.877	0.945	0.954	0.963	0.972	1.000	1.171	1.425	154
1972	0.670	0.744	0.826	0.917	0.872	0.904	0.937	0.971	1.000	0.863	0.933	209
1977	0.741	0.699	0.660	0.622	0.809	0.848	0.888	0.930	1.000	1.241	1.157	304

OC 14	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.680	0.677	0.674	0.671	0.812	0.833	0.854	0.875	1.000	0.978	1.145	1677
1972	0.719	0.688	0.658	0.630	0.848	0.853	0.857	0.862	1.000	1.170	1.148	733
1977	0.716	0.744	0.773	0.803	0.834	0.866	0.900	0.934	1.000	1.075	1.170	1090

OC 15	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.883	0.892	0.901	0.910	0.919	0.928	0.937	0.947	1.000	1.195	1.374	480
1972	0.758	0.761	0.764	0.767	0.770	0.772	0.775	0.778	1.000	0.903	1.089	714
1977	0.751	0.762	0.773	0.785	0.796	0.808	0.819	0.831	1.000	1.023	1.161	887

OC 16	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.912	0.913	0.915	0.916	0.917	0.919	0.920	0.922	1.000	1.092	1.177	1326
1972	1.016	0.999	0.982	0.965	0.949	0.933	0.917	0.902	1.000	1.162	1.221	1895
1977	0.942	0.943	0.944	0.945	0.946	0.947	0.948	0.949	1.000	1.068	1.162	2297

OC 17	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.649	0.688	0.729	0.773	0.815	0.829	0.843	0.857	1.000	1.021	0.981	1068
1972	0.619	0.639	0.660	0.682	0.830	0.838	0.846	0.854	1.000	0.979	1.079	1046
1977	0.569	0.616	0.666	0.720	0.867	0.862	0.857	0.852	1.000	1.077	1.087	1429

OC 18	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.666	0.663	0.660	0.657	0.753	0.771	0.790	0.809	1.000	1.155	1.216	632
1972	0.860	0.800	0.745	0.694	0.780	0.813	0.847	0.883	1.000	1.114	1.178	861
1977	0.656	0.661	0.666	0.671	0.738	0.771	0.806	0.841	1.000	1.032	1.244	1149

OC19	8	9	10	11	12	13	14	15	16	17	18	NOB
1972	0.828	0.812	0.796	0.780	0.749	0.786	0.825	0.866	1.000	1.156	1.164	869
1977	0.724	0.727	0.729	0.732	0.735	0.738	0.740	0.743	1.000	1.046	1.205	1014

OC20	8	9	10	11	12	13	14	15	16	17	18	NOB
1972	0.641	0.695	0.754	0.818	0.795	0.771	0.749	0.727	1.000	0.989	1.137	668
1977	0.991	0.977	0.964	0.950	0.937	0.924	0.912	0.899	1.000	1.013	1.169	876

OC21	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.689	0.706	0.724	0.742	0.752	0.794	0.837	0.883	1.000	1.071	1.148	894
1972	0.632	0.638	0.644	0.650	0.707	0.755	0.806	0.860	1.000	0.992	1.094	2591
1977	0.581	0.586	0.590	0.595	0.707	0.742	0.779	0.817	1.000	1.047	1.099	2889

OC22	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.627	0.637	0.648	0.659	0.746	0.784	0.824	0.866	1.000	1.053	1.108	11623
1972	0.620	0.632	0.645	0.657	0.735	0.767	0.800	0.835	1.000	1.059	1.056	10631
1977	0.567	0.583	0.599	0.616	0.716	0.754	0.795	0.838	1.000	1.069	1.125	13534

OC23	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.613	0.610	0.607	0.604	0.733	0.763	0.794	0.826	1.000	0.965	0.931	4584
1972	0.660	0.654	0.649	0.644	0.742	0.768	0.795	0.823	1.000	1.061	1.032	6128
1977	0.526	0.538	0.550	0.562	0.704	0.731	0.760	0.789	1.000	0.998	0.997	7007

OC24	8	9	10	11	12	13	14	15	16	17	18	NOB
1967	0.713	0.727	0.741	0.755	0.834	0.858	0.882	0.906	1.000	1.050	1.102	5588
1972	0.742	0.761	0.780	0.799	0.863	0.892	0.921	0.952	1.000	1.164	1.016	6039
1977	0.673	0.684	0.695	0.707	0.801	0.826	0.851	0.877	1.000	1.014	1.029	6684

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OC25      8      9     10     11     12     13     14     15     16     17     18      NOB

1967  0.742  0.760  0.778  0.797  0.866  0.898  0.931  0.965  1.000  1.037  1.075    17302
1972  0.790  0.797  0.804  0.811  0.901  0.928  0.956  0.984  1.000  1.054  1.112    20844
1977  0.689  0.710  0.731  0.753  0.867  0.904  0.943  0.983  1.000  1.015  1.031    25019


OC26      8      9     10     11     12     13     14     15     16     17     18      NOB

1967  0.791  0.810  0.830  0.851  0.936  0.952  0.967  0.984  1.000  1.017  1.034    10290
1972  0.804  0.813  0.822  0.831  0.959  0.972  0.985  0.998  1.000  1.038  1.078    10520
1977  0.719  0.737  0.755  0.773  0.916  0.937  0.957  0.978  1.000  1.022  1.045    12392


OC27      8      9     10     11     12     13     14     15     16     17     18      NOB

1967  0.855  0.877  0.899  0.922  1.017  1.012  1.008  1.004  1.000  0.996  0.992     4522
1972  0.913  0.922  0.931  0.940  1.013  1.009  1.006  1.003  1.000  0.997  0.994     5171
1977  0.825  0.844  0.864  0.885  0.944  0.958  0.972  0.986  1.000  1.015  1.029     6419


OC28      8      9     10     11     12     13     14     15     16     17     18      NOB

1967  0.781  0.799  0.819  0.838  0.969  0.976  0.984  0.992  1.000  1.008  1.016     3140
1972  0.937  0.958  0.979  1.001  1.164  1.184  1.205  1.226  1.000  1.085  1.178     4377
1977  0.735  0.739  0.743  0.747  0.919  0.939  0.959  0.979  1.000  1.021  1.043     5845


OC29      8      9     10     11     12     13     14     15     16     17     18      NOB

1967  0.477  0.497  0.519  0.541  0.633  0.601  0.571  0.542  1.000  0.994  0.988      916
1972  0.425  0.443  0.463  0.483  0.582  0.639  0.701  0.770  1.000  1.057  1.116     1175
1977  0.524  0.531  0.539  0.547  0.669  0.692  0.715  0.739  1.000  1.079  1.165     1777


OC30      8      9     10     11     12     13     14     15     16     17     18      NOB

1967  0.802  0.808  0.813  0.819  0.968  0.976  0.984  0.992  1.000  1.008  1.016     4018
1972  0.714  0.706  0.699  0.692  0.812  0.852  0.894  0.938  1.000  1.011  1.022     5722
1977  0.646  0.655  0.665  0.674  0.760  0.802  0.846  0.892  1.000  0.998  0.995     7863
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Turning briefly to the estimated hours equations, Table III.1.6 indicates that the age variables are generally highly statistically significant for both professional and nonprofessional occupations. While hours of work tend to be slightly higher in the professional occupations, the differentials are not great, as indicated by Tables III.1.8(1) through III.1.8(3), below. Especially in the 1977 period, however, hours of work in nonprofessional occupations tend to decline more rapidly with age, although, again, the differential decline is not great.

The employment- type dummy variables are highly significant for all nonprofessional occupations but are less frequently significant for the professional occupations. With one exception (teachers in 1977), in every case in which it is statistically significant, the selfemployment coefficient is positive, implying a significant increment in hours of work associated with selfemployment. Conversely, the government employment coefficients are generally (but not invariably) negative in those cases in which they are significant statistically.

The marital status (single, divorced and widowed) variables as a group are usually quite significant statistically. And in every case in which these variables are significant, they imply a substantial reduction in work hours by comparison to those of married individuals in the same occupation.[2] The variables relating to ages and numbers of children, however, are frequently insignificant. When they are significant, hours tend to be lower for those

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[2] It is interesting to note that, in preliminary estimates of earnings functions, if the annual hours variables were excluded from the equations but marital status variables were included, the coefficients of the single and divorced dummy variables were significantly negative and of a substantial magnitude. However, when hours were included in the equation, these marital status variables became insignificant and of marginal magnitude.

with young children and higher for those with older children, although this pattern is less pronounced in the nonprofessional occupations. Contrary to expectations, spouse earnings and hours of work are commonly insignificant. However, the coefficient of spouse hours is almost invariably positive while that of spouse earnings is also almost invariably negative. This suggests a complementary rather than a substitution relationship between husband's and wife's allocation of time to work, conjoined with an income effect of spouse's earnings which serves to reduce own hours of work.

1.3 EXPERIENCE, HOURS OF WORK AND PREDICTED EARNINGS

Predicted mean earnings $(\hat{Y}_{\hat{H}})$ by occupation and age are presented in Tables III.1.8(1) through III.1.8(3) for the years 1967, 1972 and 1977, respectively. In these tables earnings are evaluated at actual predicted hours for the occupation and age and also at the geometric mean of hours by age over the professional, technical and managerial occupations (occupations 1 through 22) in 1977. Also included in the tables are predicted mean hours, the elasticity of earnings with respect to hours and the marginal wage rate, evaluating the latter at the point of predicted mean hours and earnings.

In addition to mean hours, the earnings functions are evaluated at the modal level of schooling for each occupation:

Table III.1.8(1)

Predicted Hours and Earnings by Occupation and Age, 1967

	At Geometic Mean Hours				At Predicted Actual Hours			
	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1967	1							
25	10398.	2.292	0.225	1.02	10391.	2.285	0.227	1.03
30	12142.	2.359	0.265	1.36	12155.	2.369	0.262	1.34
35	13701.	2.401	0.292	1.67	13714.	2.409	0.290	1.65
40	14915.	2.417	0.306	1.89	14896.	2.408	0.309	1.91
45	15653.	2.411	0.305	1.98	15574.	2.372	0.317	2.08
50	15846.	2.384	0.290	1.93	15694.	2.309	0.313	2.13
55	15495.	2.341	0.259	1.71	15284.	2.227	0.293	2.01
60	14666.	2.283	0.211	1.35	14436.	2.134	0.256	1.73
65	13472.	2.216	0.145	0.86	13276.	2.035	0.200	1.30
70	12046.	2.141	0.060	0.34	11937.	1.938	0.122	0.75
	183.8		183.1					
1967	4							
25	12117.	2.292	0.320	1.69	12084.	2.272	0.321	1.71
30	14301.	2.359	0.256	1.55	14151.	2.266	0.264	1.65
35	16194.	2.401	0.215	1.45	15977.	2.259	0.227	1.61
40	17643.	2.417	0.197	1.44	17389.	2.251	0.211	1.63
45	18516.	2.411	0.201	1.55	18241.	2.244	0.215	1.75
50	18717.	2.384	0.228	1.79	18441.	2.238	0.240	1.98
55	18204.	2.341	0.276	2.15	17966.	2.233	0.285	2.29
60	17005.	2.283	0.346	2.58	16869.	2.231	0.350	2.65
65	15219.	2.216	0.438	3.01	15270.	2.232	0.436	2.98
70	13015.	2.141	0.550	3.35	13333.	2.238	0.542	3.23
	218.6		216.4					
1967	5							
30	19722.	2.359	0.879	7.35	21491.	2.627	0.718	5.87
35	22920.	2.401	0.548	5.24	23772.	2.585	0.438	4.02
40	25535.	2.417	0.358	3.78	26007.	2.562	0.271	2.75
45	27516.	2.411	0.306	3.50	27919.	2.547	0.225	2.46
50	28703.	2.384	0.392	4.72	29294.	2.528	0.306	3.54
55	28822.	2.341	0.613	7.54	29877.	2.494	0.520	6.23
60	27559.	2.283	0.966	11.66	29251.	2.436	0.875	10.50
65	24733.	2.216	1.452	16.20	26793.	2.345	1.374	15.70
70	20486.	2.141	2.066	19.77	21954.	2.215	2.022	20.04
	276.9		292.3					
1967	6							
25	12596.	2.292	2.072	11.39	8707.	1.906	1.936	8.84
30	14940.	2.359	1.407	8.91	11236.	1.903	1.246	7.36
35	16567.	2.401	0.879	6.08	14224.	1.983	0.732	5.25
40	17702.	2.417	0.489	3.58	16684.	2.109	0.380	3.01
45	18444.	2.411	0.237	1.81	18164.	2.239	0.176	1.43
50	18879.	2.384	0.124	0.98	18820.	2.320	0.101	0.82
55	18947.	2.341	0.151	1.22	18894.	2.295	0.135	1.11
60	18490.	2.283	0.320	2.59	18095.	2.120	0.262	2.24
65	17310.	2.216	0.631	4.93	15375.	1.789	0.480	4.13
70	15284.	2.141	1.086	7.76	9906.	1.347	0.806	5.93
	210.9		183.2					
1967	8							
25	11766.	2.292	0.926	4.76	10688.	2.073	0.987	5.09
30	14129.	2.359	0.538	3.22	13410.	2.152	0.596	3.71
35	15993.	2.401	0.242	1.61	15590.	2.186	0.302	2.15
40	17320.	2.417	0.038	0.27	17197.	2.187	0.103	0.81
45	18090.	2.411	-0.074	-0.55	18166.	2.168	-0.006	-0.05
50	18268.	2.384	-0.095	-0.73	18388.	2.143	-0.028	-0.24
55	17795.	2.341	-0.027	-0.20	17788.	2.126	0.033	0.28
60	16618.	2.283	0.131	0.95	16443.	2.130	0.174	1.34
65	14746.	2.216	0.377	2.51	14628.	2.170	0.390	2.63
70	12299.	2.141	0.710	4.06	12770.	2.260	0.677	3.82
	198.8		193.8					

Table III.1.8(1), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1967	9							
25	9221.	2.292	0.508	2.04	9149.	2.257	0.514	2.08
30	10775.	2.359	0.330	1.51	10634.	2.269	0.345	1.62
35	12063.	2.401	0.197	0.99	11927.	2.273	0.218	1.14
40	13025.	2.417	0.108	0.58	12925.	2.268	0.133	0.76
45	13615.	2.411	0.064	0.36	13545.	2.254	0.090	0.54
50	13792.	2.384	0.063	0.36	13722.	2.230	0.089	0.55
55	13523.	2.341	0.106	0.61	13422.	2.197	0.130	0.79
60	12795.	2.283	0.191	1.07	12645.	2.153	0.213	1.25
65	11633.	2.216	0.319	1.67	11431.	2.100	0.338	1.84
70	10111.	2.141	0.488	2.31	9867.	2.038	0.505	2.45
	177.5		176.1					
1967	10							
30	17988.	2.359	0.761	5.61	19314.	2.594	0.738	5.50
35	21122.	2.401	0.503	4.43	22075.	2.625	0.481	4.04
40	23508.	2.417	0.295	2.87	24106.	2.640	0.273	2.50
45	24988.	2.411	0.138	1.43	25267.	2.631	0.116	1.12
50	25476.	2.384	0.030	0.32	25518.	2.589	0.010	0.10
55	24937.	2.341	-0.028	-0.30	24674.	2.511	-0.045	-0.44
60	23404.	2.283	-0.037	-0.37	23356.	2.393	-0.047	-0.46
65	20969.	2.216	0.004	0.04	20969.	2.235	0.002	0.02
70	17696.	2.141	0.093	0.78	17614.	2.039	0.103	0.90
	246.0		257.1					
1967	11							
30	15713.	2.359	0.371	2.47	16784.	3.557	-0.081	-0.38
35	22478.	2.401	0.367	3.44	24011.	3.405	-0.012	-0.08
40	29162.	2.417	0.374	4.51	31221.	3.336	0.027	0.25
45	34388.	2.411	0.390	5.56	36982.	3.312	0.050	0.56
50	36782.	2.384	0.415	6.40	39918.	3.301	0.069	0.83
55	35704.	2.341	0.448	6.83	39233.	3.270	0.097	1.16
60	31443.	2.283	0.486	6.70	35046.	3.188	0.145	1.59
65	25116.	2.216	0.530	6.01	28326.	3.029	0.223	2.09
70	18195.	2.141	0.578	4.91	20525.	2.778	0.337	2.49
	279.0		301.5					
1967	12							
25	6440.	2.292	0.286	0.80	6680.	2.781	0.087	0.21
30	7749.	2.359	0.201	0.66	7839.	3.200	-0.142	-0.35
35	8889.	2.401	0.128	0.47	8587.	3.536	-0.336	-0.82
40	9749.	2.417	0.065	0.26	8959.	3.768	-0.487	-1.16
45	10242.	2.411	0.013	0.06	9028.	3.885	-0.589	-1.37
50	10321.	2.384	-0.030	-0.13	8853.	3.893	-0.646	-1.47
55	9988.	2.341	-0.065	-0.28	8467.	3.805	-0.663	-1.48
60	9286.	2.283	-0.093	-0.38	7888.	3.643	-0.649	-1.40
65	8299.	2.216	-0.116	-0.44	7134.	3.429	-0.612	-1.27
70	7131.	2.141	-0.136	-0.45	6241.	3.186	-0.563	-1.10
	108.1		101.4					
1967	13							
25	7840.	2.292	0.146	0.50	7749.	2.157	0.234	0.84
30	9866.	2.359	0.271	1.13	9676.	2.219	0.362	1.58
35	11809.	2.401	0.353	1.74	11430.	2.219	0.472	2.43
40	13370.	2.417	0.392	2.17	12699.	2.169	0.554	3.24
45	14287.	2.411	0.386	2.29	13305.	2.087	0.597	3.80
50	14426.	2.384	0.334	2.02	13263.	1.991	0.590	3.93
55	13811.	2.341	0.234	1.38	12735.	1.895	0.524	3.52
60	12607.	2.283	0.083	0.46	11920.	1.812	0.390	2.56
65	11054.	2.216	-0.120	-0.60	10959.	1.752	0.181	1.13
70	9385.	2.141	-0.378	-1.66	9880.	1.725	-0.108	-0.62
	165.5		159.2					

Table III.1.8(1), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y.H}$	W_m
1967	14							
25	9402.	2.292	0.553	2.27	8985.	2.120	0.612	2.59
30	11669.	2.359	0.335	1.66	11414.	2.218	0.383	1.97
35	13647.	2.401	0.143	0.82	13522.	2.271	0.188	1.12
40	15153.	2.417	-0.021	-0.13	15152.	2.284	0.025	0.16
45	16061.	2.411	-0.161	-1.07	16196.	2.267	-0.111	-0.79
50	16307.	2.384	-0.275	-1.68	16582.	2.226	-0.221	-1.64
55	15890.	2.341	-0.366	-2.48	16278.	2.179	-0.310	-2.31
60	14870.	2.283	-0.434	-2.82	15299.	2.129	-0.380	-2.73
65	13356.	2.216	-0.480	-2.89	13731.	2.035	-0.435	-2.87
70	11496.	2.141	-0.507	-2.72	11724.	2.053	-0.478	-2.72
	179.6		176.5					

1967	15							
30	10604.	2.359	0.559	2.51	10586.	2.352	0.560	2.52
35	13437.	2.401	0.484	2.71	13726.	2.510	0.472	2.58
40	16039.	2.417	0.433	2.87	16521.	2.593	0.414	2.64
45	18080.	2.411	0.406	3.05	18663.	2.612	0.384	2.74
50	19267.	2.384	0.404	3.26	19901.	2.590	0.381	2.93
55	19404.	2.341	0.425	3.52	20090.	2.546	0.402	3.17
60	18449.	2.283	0.469	3.79	19240.	2.503	0.444	3.41
65	16527.	2.216	0.536	4.00	17533.	2.482	0.506	3.58
70	13918.	2.141	0.625	4.06	15293.	2.501	0.585	3.58
	166.5		170.8					

1967	16							
25	7999.	2.292	0.090	0.31	8016.	2.352	0.077	0.26
30	9477.	2.359	0.050	0.20	9479.	2.369	0.048	0.19
35	10767.	2.401	0.037	0.17	10764.	2.387	0.040	0.18
40	11748.	2.417	0.052	0.25	11745.	2.404	0.055	0.27
45	12313.	2.411	0.094	0.48	12316.	2.415	0.093	0.47
50	12381.	2.384	0.163	0.84	12411.	2.421	0.154	0.79
55	11917.	2.341	0.257	1.31	12009.	2.414	0.240	1.20
60	10948.	2.283	0.376	1.80	11139.	2.394	0.351	1.63
65	9568.	2.216	0.520	2.25	9873.	2.358	0.488	2.04
70	7927.	2.141	0.687	2.55	8323.	2.303	0.651	2.35
	145.0		145.4					

1967	17							
25	9808.	2.292	0.409	1.75	9494.	2.117	0.409	1.83
30	11993.	2.359	0.315	1.60	11705.	2.185	0.315	1.69
35	13873.	2.401	0.241	1.39	13625.	2.227	0.241	1.47
40	15241.	2.417	0.186	1.18	15033.	2.245	0.186	1.25
45	15938.	2.411	0.152	1.00	15762.	2.241	0.151	1.06
50	15879.	2.384	0.137	0.91	15720.	2.215	0.136	0.97
55	15072.	2.341	0.142	0.91	14914.	2.173	0.141	0.97
60	13614.	2.283	0.166	0.99	13442.	2.115	0.166	1.05
65	11683.	2.216	0.211	1.11	11489.	2.047	0.210	1.18
70	9503.	2.141	0.275	1.22	9289.	1.970	0.275	1.30
	192.2		188.3					

1967	18							
25	9513.	2.292	0.884	3.67	9542.	2.300	0.883	3.66
30	11032.	2.359	0.587	2.74	10860.	2.298	0.596	2.82
35	12241.	2.401	0.351	1.79	12033.	2.289	0.367	1.93
40	13145.	2.417	0.177	0.96	12998.	2.276	0.197	1.12
45	13754.	2.411	0.063	0.36	13688.	2.259	0.085	0.51
50	14062.	2.384	0.011	0.06	14044.	2.241	0.031	0.19
55	14039.	2.341	0.018	0.11	14020.	2.222	0.035	0.22
60	13643.	2.283	0.085	0.51	13599.	2.203	0.096	0.59
65	12835.	2.216	0.211	1.22	12800.	2.187	0.215	1.26
70	11612.	2.141	0.396	2.15	11683.	2.174	0.391	2.10
	182.8		182.2					

Table III.1.8(1), continued

	$Y_{\bar H}$	$\bar H$	$\eta_{Y,H}$	$\bar W_m$	$\bar Y_{\bar H}$	$\bar H$	$\eta_{Y,H}$	W_m
1967	21							
25	10043.	2.292	0.582	2.55	10312.	2.403	0.534	2.29
30	11627.	2.359	0.427	2.11	11704.	2.397	0.411	2.01
35	13000.	2.401	0.324	1.76	12986.	2.393	0.328	1.78
40	14122.	2.417	0.273	1.60	14073.	2.388	0.286	1.69
45	14944.	2.411	0.273	1.69	14889.	2.380	0.287	1.80
50	15407.	2.384	0.323	2.09	15367.	2.365	0.331	2.15
55	15441.	2.341	0.421	2.78	15447.	2.343	0.420	2.77
60	14985.	2.283	0.566	3.71	15082.	2.310	0.554	3.62
65	14013.	2.216	0.756	4.78	14239.	2.264	0.735	4.62
70	12555.	2.141	0.990	5.81	12913.	2.203	0.963	5.64
	192.6		194.6					
1967	22							
25	10958.	2.292	0.475	2.27	11216.	2.412	0.437	2.03
30	13200.	2.359	0.365	2.04	13387.	2.457	0.334	1.82
35	15175.	2.401	0.276	1.74	15313.	2.485	0.249	1.53
40	16717.	2.417	0.207	1.43	16823.	2.497	0.182	1.22
45	17693.	2.411	0.158	1.16	17778.	2.492	0.133	0.95
50	18016.	2.384	0.129	0.97	18089.	2.469	0.102	0.75
55	17657.	2.341	0.117	0.88	17725.	2.429	0.089	0.65
60	16652.	2.283	0.123	0.90	16722.	2.373	0.094	0.66
65	15098.	2.216	0.144	0.98	15173.	2.302	0.117	0.77
70	13143.	2.141	0.181	1.11	13220.	2.216	0.157	0.93
	220.2		223.0					
1967	23							
25	9109.	2.292	0.741	2.94	9068.	2.278	0.745	2.97
30	11024.	2.359	0.587	2.74	11160.	2.410	0.571	2.64
35	12607.	2.401	0.459	2.41	12824.	2.495	0.429	2.20
40	13701.	2.417	0.355	2.01	13917.	2.532	0.319	1.75
45	14206.	2.411	0.276	1.63	14375.	2.524	0.240	1.37
50	14086.	2.384	0.221	1.30	14195.	2.475	0.192	1.10
55	13371.	2.341	0.188	1.07	13422.	2.391	0.172	0.96
60	12151.	2.283	0.176	0.94	12146.	2.279	0.177	0.95
65	10561.	2.216	0.185	0.88	10497.	2.147	0.206	1.01
70	8767.	2.141	0.213	0.87	8632.	2.004	0.256	1.10
	177.2		178.2					
1967	24							
20	6541.	2.199	0.758	2.26	6202.	2.054	0.807	2.44
25	7895.	2.292	0.526	1.81	7728.	2.203	0.556	1.95
30	9039.	2.359	0.344	1.32	6969.	2.308	0.361	1.40
35	9922.	2.401	0.211	0.87	9892.	2.368	0.222	0.93
40	10515.	2.417	0.126	0.55	10496.	2.385	0.137	0.60
45	10796.	2.411	0.091	0.41	10776.	2.368	0.105	0.48
50	10748.	2.384	0.102	0.46	10715.	2.322	0.124	0.57
55	10360.	2.341	0.161	0.71	10293.	2.255	0.189	0.86
60	9637.	2.283	0.264	1.12	9509.	2.178	0.300	1.31
65	8612.	2.216	0.412	1.60	8406.	2.095	0.452	1.82
70	7354.	2.141	0.603	2.07	7081.	2.015	0.645	2.27
	156.5		154.1					
1967	25							
20	7741.	2.199	0.460	1.62	7797.	2.234	0.454	1.59
25	9029.	2.292	0.342	1.35	8972.	2.251	0.349	1.39
30	10153.	2.359	0.250	1.07	10047.	2.265	0.266	1.18
35	11068.	2.401	0.185	0.85	10954.	2.277	0.206	0.99
40	11740.	2.417	0.146	0.71	11634.	2.282	0.170	0.87
45	12138.	2.411	0.134	0.67	12039.	2.279	0.157	0.83
50	12236.	2.384	0.147	0.76	12139.	2.267	0.168	0.90
55	12017.	2.341	0.186	0.95	11918.	2.243	0.203	1.08
60	11476.	2.283	0.249	1.25	11377.	2.207	0.263	1.35
65	10630.	2.216	0.336	1.61	10534.	2.157	0.347	1.69
70	9524.	2.141	0.447	1.99	9426.	2.093	0.456	2.05
	177.6		176.5					

Table III.1.8(1), concluded

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1967	26							
20	7044.	2.199	0.624	2.00	6959.	2.157	0.634	2.05
25	8155.	2.292	0.455	1.62	7995.	2.197	0.478	1.74
30	9093.	2.359	0.328	1.26	8915.	2.228	0.359	1.44
35	9845.	2.401	0.241	0.99	9679.	2.248	0.277	1.19
40	10402.	2.417	0.195	0.84	10250.	2.257	0.233	1.06
45	10751.	2.411	0.189	0.84	10601.	2.254	0.226	1.06
50	10871.	2.384	0.223	1.02	10706.	2.238	0.258	1.23
55	10736.	2.341	0.296	1.36	10542.	2.208	0.327	1.56
60	10323.	2.283	0.407	1.84	10094.	2.165	0.435	2.03
65	9624.	2.216	0.555	2.41	9359.	2.109	0.581	2.58
70	8659.	2.141	0.740	2.99	8352.	2.040	0.764	3.13
	159.4		156.7					
1967	27							
20	6339.	2.199	0.739	2.13	6462.	2.257	0.730	2.09
25	7904.	2.292	0.597	2.06	8136.	2.408	0.579	1.96
30	9342.	2.359	0.483	1.91	9608.	2.504	0.459	1.76
35	10535.	2.401	0.395	1.73	10784.	2.551	0.371	1.57
40	11389.	2.417	0.335	1.58	11598.	2.557	0.312	1.42
45	11832.	2.411	0.301	1.48	12004.	2.533	0.281	1.33
50	11828.	2.384	0.293	1.45	11977.	2.491	0.275	1.32
55	11375.	2.341	0.310	1.51	11525.	2.444	0.293	1.38
60	10509.	2.283	0.353	1.62	10692.	2.401	0.334	1.49
65	9309.	2.216	0.420	1.76	9574.	2.374	0.394	1.59
70	7685.	2.141	0.511	1.68	8295.	2.373	0.473	1.65
	162.4		166.0					
1967	28							
20	5466.	2.199	0.642	1.60	5163.	2.019	0.693	1.77
25	6730.	2.292	0.451	1.32	6561.	2.171	0.485	1.47
30	7879.	2.359	0.302	1.01	7789.	2.275	0.326	1.12
35	8850.	2.401	0.194	0.72	8797.	2.332	0.214	0.81
40	9590.	2.417	0.129	0.51	9551.	2.347	0.149	0.60
45	10056.	2.411	0.104	0.43	10017.	2.330	0.127	0.55
50	10209.	2.384	0.119	0.51	10154.	2.290	0.146	0.65
55	10021.	2.341	0.173	0.74	9935.	2.237	0.203	0.90
60	9483.	2.283	0.266	1.10	9361.	2.181	0.295	1.27
65	8619.	2.216	0.396	1.54	8482.	2.130	0.420	1.67
70	7489.	2.141	0.562	1.97	7394.	2.093	0.576	2.03
	136.8		134.5					
1967	29							
20	4006.	2.199	0.461	0.84	4208.	2.473	0.371	0.63
25	5056.	2.292	0.392	0.86	5376.	2.789	0.229	0.44
30	6067.	2.359	0.337	0.87	6421.	2.998	0.128	0.27
35	6943.	2.401	0.298	0.86	7285.	3.096	0.070	0.16
40	7592.	2.417	0.273	0.86	7911.	3.098	0.050	0.13
45	7942.	2.411	0.262	0.86	8246.	3.027	0.060	0.16
50	7953.	2.384	0.264	0.88	8244.	2.911	0.091	0.26
55	7622.	2.341	0.278	0.91	7900.	2.779	0.134	0.38
60	6991.	2.283	0.303	0.93	7252.	2.654	0.182	0.50
65	6132.	2.216	0.338	0.94	6386.	2.557	0.226	0.56
70	5139.	2.141	0.382	0.92	5407.	2.505	0.262	0.57
	106.9		112.2					
1967	30							
20	5536.	2.199	0.846	2.13	5256.	2.071	0.884	2.25
25	6624.	2.292	0.683	1.98	6572.	2.265	0.691	2.00
30	7567.	2.359	0.551	1.77	7649.	2.407	0.537	1.71
35	8314.	2.401	0.448	1.55	8447.	2.490	0.422	1.43
40	8830.	2.417	0.375	1.37	8961.	2.518	0.346	1.23
45	9095.	2.411	0.332	1.25	9198.	2.497	0.307	1.13
50	9097.	2.384	0.318	1.21	9161.	2.439	0.302	1.13
55	8836.	2.341	0.330	1.25	8850.	2.352	0.327	1.23
60	8325.	2.283	0.370	1.35	8277.	2.249	0.380	1.40
65	7593.	2.216	0.435	1.49	7474.	2.139	0.458	1.60
70	6687.	2.141	0.525	1.64	6499.	2.031	0.557	1.78
	130.4		130.1					

Predicted Hours and Earnings by Occupation and Age, 1972

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y.H}$	W_m
1972	1							
25	11929.	2.292	0.584	3.04	12059.	2.335	0.579	2.99
30	14957.	2.359	0.570	3.61	14921.	2.350	0.571	3.63
35	17749.	2.401	0.542	4.01	17606.	2.365	0.547	4.07
40	19948.	2.417	0.503	4.15	19795.	2.381	0.508	4.22
45	21262.	2.411	0.450	3.97	21192.	2.394	0.452	4.01
50	21537.	2.384	0.384	3.47	21596.	2.402	0.382	3.43
55	20783.	2.341	0.305	2.70	20946.	2.403	0.296	2.58
60	19163.	2.283	0.211	1.77	19350.	2.395	0.196	1.58
65	16934.	2.216	0.103	0.79	17044.	2.377	0.081	0.58
70	14387.	2.141	-0.020	-0.14	14342.	2.345	-0.048	-0.29
	233.7		233.8					
1972	2							
25	13649.	2.292	-0.935	-5.57	13605.	2.300	-0.945	-5.59
30	16902.	2.359	-0.362	-2.60	16850.	2.379	-0.386	-2.73
35	20429.	2.401	0.053	0.45	20426.	2.398	0.056	0.48
40	23529.	2.417	0.308	3.00	23378.	2.372	0.363	3.58
45	25526.	2.411	0.401	4.25	25078.	2.319	0.511	5.53
50	26063.	2.384	0.330	3.60	25499.	2.259	0.480	5.42
55	25253.	2.341	0.089	0.96	25004.	2.208	0.249	2.81
60	23582.	2.283	-0.324	-3.35	23866.	2.182	-0.202	-2.21
65	21675.	2.216	-0.914	-8.95	21862.	2.195	-0.889	-8.86
70	20103.	2.141	-1.686	-15.83	18208.	2.265	-1.834	-14.75
	275.3		273.5					
1972	3							
25	11438.	2.292	0.574	2.87	10965.	2.137	0.636	3.26
30	13966.	2.359	0.319	1.89	13700.	2.232	0.370	2.27
35	16114.	2.401	0.128	0.86	15969.	2.265	0.182	1.28
40	17737.	2.417	-0.000	-0.00	17696.	2.253	0.066	0.51
45	18720.	2.411	-0.065	-0.51	18761.	2.217	0.012	0.10
50	18969.	2.384	-0.069	-0.55	19016.	2.175	0.014	0.13
55	18425.	2.341	-0.013	-0.10	18383.	2.145	0.065	0.56
60	17084.	2.283	0.102	0.76	16949.	2.148	0.156	1.23
65	15032.	2.216	0.275	1.86	15002.	2.200	0.281	1.92
70	12465.	2.141	0.504	2.93	12955.	2.325	0.430	2.40
	217.5		214.7					
1972	4							
25	12269.	2.292	-0.025	-0.13	12280.	2.203	-0.022	-0.12
30	14685.	2.359	0.037	0.23	14650.	2.221	0.042	0.28
35	16933.	2.401	0.092	0.65	16820.	2.235	0.097	0.73
40	18767.	2.417	0.138	1.07	18574.	2.245	0.143	1.19
45	19963.	2.411	0.176	1.46	19713.	2.247	0.181	1.59
50	20365.	2.384	0.206	1.76	20093.	2.235	0.210	1.89
55	19918.	2.341	0.227	1.93	19656.	2.209	0.231	2.06
60	18685.	2.283	0.240	1.97	18444.	2.164	0.244	2.08
65	16821.	2.216	0.245	1.86	16598.	2.099	0.248	1.96
70	14547.	2.141	0.240	1.63	14331.	2.013	0.244	1.74
	229.8		226.1					
1972	5							
30	19460.	2.359	0.833	6.67	20822.	2.590	0.615	4.95
35	24370.	2.401	0.750	7.61	26153.	2.693	0.474	4.60
40	28500.	2.417	0.689	8.14	30543.	2.735	0.388	4.34
45	31403.	2.411	0.649	8.46	33399.	2.724	0.354	4.34
50	32455.	2.384	0.627	8.54	34309.	2.667	0.361	4.64
55	31566.	2.341	0.621	8.37	33144.	2.575	0.400	5.14
60	28919.	2.283	0.626	7.93	30114.	2.460	0.459	5.62
65	24971.	2.216	0.640	7.21	25740.	2.334	0.528	5.83
70	20337.	2.141	0.659	6.26	20715.	2.204	0.599	5.63
	293.3		311.7					

Table III.1.8(2), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	$\bar{W}_m$	$\bar{Y}_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1972	6							
25	12836.	2.292	0.557	3.12	12880.	2.305	0.541	3.02
30	16424.	2.359	0.496	3.46	16242.	2.310	0.550	3.87
35	19921.	2.401	0.496	4.11	19619.	2.333	0.569	4.78
40	22956.	2.417	0.553	5.25	22692.	2.370	0.604	5.79
45	25122.	2.411	0.666	6.94	25138.	2.413	0.663	6.91
50	26040.	2.384	0.832	9.09	26671.	2.457	0.753	8.18
55	25460.	2.341	1.048	11.40	27079.	2.495	0.882	9.57
60	23360.	2.283	1.310	13.40	26237.	2.518	1.057	11.01
65	20001.	2.216	1.615	14.58	24118.	2.520	1.287	12.32
70	15893.	2.141	1.959	14.54	20813.	2.492	1.580	13.19
	256.3		261.1					
1972	7							
25	12222.	2.292	0.283	1.51	12344.	2.374	0.284	1.48
30	14996.	2.359	0.215	1.36	14908.	2.296	0.214	1.39
35	17531.	2.401	0.161	1.18	17351.	2.252	0.161	1.24
40	19582.	2.417	0.124	1.00	19389.	2.231	0.123	1.07
45	20933.	2.411	0.102	0.88	20762.	2.224	0.102	0.95
50	21429.	2.384	0.096	0.86	21286.	2.223	0.095	0.91
55	21000.	2.341	0.105	0.95	20883.	2.220	0.105	0.99
60	19684.	2.283	0.131	1.13	19595.	2.206	0.131	1.16
65	17620.	2.216	0.172	1.37	17562.	2.173	0.172	1.39
70	15036.	2.141	0.228	1.60	14994.	2.115	0.228	1.62
	239.6		238.7					
1972	8							
25	11364.	2.292	0.339	1.68	10844.	2.005	0.361	1.95
30	14142.	2.359	0.276	1.65	13675.	2.098	0.295	1.93
35	16807.	2.401	0.238	1.67	16335.	2.140	0.258	1.97
40	19129.	2.417	0.227	1.79	18595.	2.145	0.247	2.14
45	20873.	2.411	0.240	2.08	20226.	2.127	0.261	2.49
50	21829.	2.384	0.279	2.56	21040.	2.100	0.300	3.01
55	21849.	2.341	0.344	3.21	20960.	2.081	0.363	3.65
60	20883.	2.283	0.433	3.96	20057.	2.083	0.447	4.31
65	19005.	2.216	0.546	4.69	18557.	2.122	0.553	4.84
70	16414.	2.141	0.684	5.25	16795.	2.214	0.679	5.15
	217.6		210.4					
1972	9							
25	9051.	2.292	0.495	1.95	8709.	2.123	0.511	2.10
30	11086.	2.359	0.311	1.46	10756.	2.147	0.331	1.66
35	12886.	2.401	0.174	0.94	12641.	2.165	0.197	1.15
40	14315.	2.417	0.086	0.51	14170.	2.178	0.109	0.71
45	15256.	2.411	0.045	0.28	15172.	2.182	0.067	0.46
50	15613.	2.384	0.050	0.33	15528.	2.179	0.070	0.50
55	15318.	2.341	0.103	0.66	15186.	2.167	0.120	0.84
60	14358.	2.283	0.203	1.27	14172.	2.145	0.216	1.43
65	12796.	2.216	0.348	2.01	12584.	2.113	0.358	2.13
70	10779.	2.141	0.540	2.72	10587.	2.071	0.546	2.79
	187.5		183.6					
1972	10							
30	19549.	2.359	0.371	3.07	19500.	2.344	0.376	3.13
35	23610.	2.401	0.249	2.45	23593.	2.394	0.252	2.48
40	26857.	2.417	0.140	1.55	26862.	2.420	0.138	1.54
45	28879.	2.411	0.040	0.48	28883.	2.421	0.037	0.45
50	29433.	2.384	-0.049	-0.60	29428.	2.392	-0.051	-0.63
55	28491.	2.341	-0.129	-1.57	28500.	2.335	-0.127	-1.55
60	26231.	2.283	-0.202	-2.32	26308.	2.250	-0.191	-2.23
65	22990.	2.216	-0.268	-2.78	23202.	2.137	-0.242	-2.63
70	19189.	2.141	-0.328	-2.94	19590.	2.001	-0.282	-2.76
	277.4		277.3					

Table III.1.8(2), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1972	11							
30	18807.	2.359	0.178	1.42	19192.	3.485	-0.092	-0.51
35	26034.	2.401	0.117	1.27	26186.	3.263	-0.090	-0.72
40	33185.	2.417	0.063	0.87	33005.	3.148	-0.112	-1.18
45	39017.	2.411	0.016	0.26	38417.	3.092	-0.147	-1.83
50	42370.	2.384	-0.025	-0.45	41311.	3.054	-0.186	-2.52
55	42538.	2.341	-0.061	-1.11	41121.	2.999	-0.219	-3.00
60	39506.	2.283	-0.092	-1.60	38018.	2.892	-0.239	-3.14
65	33955.	2.216	-0.120	-1.84	32774.	2.705	-0.238	-2.88
70	27013.	2.141	-0.145	-1.83	26412.	2.428	-0.214	-2.33
	328.1		325.3					
1972	12							
25	6272.	2.292	0.302	0.83	6502.	2.954	-0.032	-0.07
30	7685.	2.359	0.307	1.00	7921.	3.251	-0.142	-0.35
35	8890.	2.401	0.312	1.15	9079.	3.480	-0.232	-0.61
40	9706.	2.417	0.315	1.27	9823.	3.634	-0.298	-0.81
45	9998.	2.411	0.317	1.31	10052.	3.712	-0.339	-0.92
50	9722.	2.384	0.315	1.28	9738.	3.719	-0.357	-0.94
55	8931.	2.341	0.308	1.18	8930.	3.664	-0.359	-0.87
60	7761.	2.283	0.295	1.00	7750.	3.560	-0.349	-0.76
65	6389.	2.216	0.273	0.79	6364.	3.422	-0.335	-0.62
70	4992.	2.141	0.241	0.56	4946.	3.261	-0.323	-0.49
	103.3		105.1					
1972	13							
25	8723.	2.292	0.435	1.66	8359.	2.109	0.588	2.33
30	10829.	2.359	0.362	1.66	10658.	2.267	0.438	2.06
35	12584.	2.401	0.271	1.42	12547.	2.376	0.292	1.54
40	13705.	2.417	0.162	0.92	13720.	2.435	0.148	0.83
45	14026.	2.411	0.033	0.19	14030.	2.448	0.002	0.01
50	13542.	2.384	-0.117	-0.67	13512.	2.424	-0.151	-0.84
55	12393.	2.341	-0.293	-1.55	12344.	2.371	-0.319	-1.66
60	10811.	2.283	-0.496	-2.35	10773.	2.299	-0.510	-2.39
65	9044.	2.216	-0.729	-2.98	9038.	2.218	-0.731	-2.98
70	7300.	2.141	-0.996	-3.40	7322.	2.135	-0.991	-3.40
	170.3		167.5					
1972	14							
25	9420.	2.292	0.582	2.39	8734.	2.023	0.627	2.71
30	12201.	2.359	0.320	1.66	11769.	2.122	0.359	1.99
35	14735.	2.401	0.115	0.70	14548.	2.181	0.151	1.00
40	16754.	2.417	-0.035	-0.24	16781.	2.207	-0.001	-0.01
45	18039.	2.411	-0.129	-0.97	18218.	2.208	-0.096	-0.79
50	18430.	2.384	-0.168	-1.30	18663.	2.195	-0.137	-1.16
55	17850.	2.341	-0.152	-1.16	18029.	2.178	-0.125	-1.04
60	16336.	2.283	-0.081	-0.58	16397.	2.167	-0.062	-0.47
65	14053.	2.216	0.043	0.27	14040.	2.172	0.050	0.32
70	11291.	2.141	0.220	1.16	11361.	2.203	0.210	1.08
	192.8		189.4					
1972	15							
30	11222.	2.359	0.682	3.25	10530.	2.158	0.740	3.61
35	14417.	2.401	0.415	2.49	14204.	2.318	0.438	2.68
40	17352.	2.417	0.212	1.52	17338.	2.408	0.215	1.55
45	19715.	2.411	0.075	0.61	19727.	2.432	0.069	0.56
50	21218.	2.384	0.001	0.01	21217.	2.402	-0.004	-0.03
55	21629.	2.341	-0.009	-0.09	21630.	2.331	-0.007	-0.06
60	20823.	2.283	0.042	0.39	20801.	2.237	0.056	0.52
65	18834.	2.216	0.155	1.32	18715.	2.133	0.179	1.57
70	15899.	2.141	0.329	2.44	15620.	2.033	0.359	2.76
	180.5		177.2					

Table III.1.8(2), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1972	16							
25	9001.	2.292	0.206	0.81	9012.	2.306	0.204	0.80
30	10566.	2.359	0.135	0.60	10551.	2.334	0.138	0.62
35	11925.	2.401	0.076	0.38	11910.	2.362	0.081	0.41
40	12974.	2.417	0.030	0.16	12968.	2.384	0.035	0.19
45	13628.	2.411	-0.003	-0.02	13628.	2.391	-0.001	-0.01
50	13833.	2.384	-0.025	-0.15	13834.	2.379	-0.025	-0.14
55	13572.	2.341	-0.035	-0.20	13571.	2.342	-0.035	-0.21
60	12865.	2.283	-0.034	-0.19	12867.	2.274	-0.033	-0.19
65	11774.	2.216	-0.023	-0.12	11779.	2.172	-0.017	-0.09
70	10394.	2.141	-0.001	-0.00	10391.	2.037	0.012	0.06
	162.5		162.4					
1972	17							
25	10529.	2.292	0.260	1.20	10276.	2.121	0.366	1.77
30	13225.	2.359	0.271	1.52	12896.	2.185	0.379	2.24
35	15766.	2.401	0.277	1.82	15374.	2.225	0.385	2.66
40	17822.	2.417	0.279	2.06	17392.	2.246	0.385	2.98
45	19098.	2.411	0.275	2.16	18676.	2.251	0.374	3.10
50	19413.	2.384	0.264	2.15	19050.	2.243	0.351	2.98
55	18741.	2.341	0.243	1.95	18481.	2.227	0.314	2.60
60	17212.	2.283	0.211	1.59	17074.	2.206	0.258	2.00
65	15075.	2.216	0.165	1.12	15040.	2.187	0.183	1.26
70	12624.	2.141	0.104	0.61	12640.	2.171	0.085	0.50
	220.3		215.5					
1972	18							
25	9666.	2.292	0.523	2.21	9253.	2.117	0.572	2.50
30	11276.	2.359	0.380	1.82	10829.	2.139	0.442	2.24
35	12657.	2.401	0.280	1.47	12245.	2.161	0.346	1.96
40	13745.	2.417	0.221	1.26	13387.	2.179	0.287	1.76
45	14483.	2.411	0.203	1.22	14163.	2.192	0.265	1.71
50	14813.	2.384	0.227	1.41	14505.	2.195	0.280	1.85
55	14684.	2.341	0.290	1.82	14373.	2.185	0.333	2.19
60	14069.	2.283	0.391	2.41	13753.	2.160	0.426	2.71
65	12975.	2.216	0.531	3.11	12658.	2.117	0.558	3.34
70	11466.	2.141	0.707	3.79	11132.	2.055	0.731	3.96
	188.6		182.6					
1972	19							
25	11520.	2.292	0.560	2.82	11647.	2.338	0.540	2.69
30	14838.	2.359	0.577	3.63	14790.	2.345	0.583	3.67
35	18152.	2.401	0.573	4.33	17961.	2.358	0.592	4.51
40	21069.	2.417	0.548	4.78	20813.	2.365	0.571	5.03
45	23219.	2.411	0.502	4.84	22972.	2.361	0.524	5.10
50	24344.	2.384	0.434	4.43	24136.	2.339	0.454	4.68
55	24358.	2.341	0.341	3.55	24175.	2.291	0.363	3.83
60	23354.	2.283	0.223	2.28	23180.	2.213	0.254	2.66
65	21558.	2.216	0.078	0.75	21439.	2.100	0.128	1.31
70	19256.	2.141	-0.096	-0.86	19352.	1.953	-0.013	-0.13
	249.3		248.1					
1972	20							
25	12498.	2.292	0.450	2.45	12576.	2.324	0.452	2.45
30	15074.	2.359	0.339	2.16	15022.	2.335	0.337	2.17
35	17432.	2.401	0.253	1.84	17374.	2.369	0.251	1.84
40	19418.	2.417	0.193	1.55	19415.	2.415	0.193	1.55
45	20888.	2.411	0.159	1.38	20960.	2.463	0.162	1.38
50	21719.	2.384	0.151	1.37	21879.	2.501	0.157	1.38
55	21818.	2.341	0.169	1.57	22094.	2.516	0.179	1.57
60	21139.	2.283	0.213	1.98	21558.	2.497	0.226	1.95
65	19703.	2.216	0.285	2.53	20246.	2.433	0.297	2.47
70	17610.	2.141	0.383	3.15	18156.	2.316	0.393	3.08
	222.9		223.8					

Table III.1.8(2), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1972	21							
25	10495.	2.292	0.514	2.35	10962.	2.505	0.465	2.03
30	12878.	2.359	0.338	1.85	13242.	2.579	0.287	1.47
35	14978.	2.401	0.211	1.32	15202.	2.597	0.165	0.97
40	16626.	2.417	0.133	0.91	16747.	2.574	0.096	0.63
45	17674.	2.411	0.102	0.75	17747.	2.526	0.075	0.53
50	18003.	2.384	0.119	0.90	18071.	2.469	0.100	0.73
55	17544.	2.341	0.183	1.37	17641.	2.416	0.166	1.21
60	16300.	2.283	0.293	2.09	16495.	2.382	0.270	1.87
65	14369.	2.216	0.447	2.90	14817.	2.380	0.409	2.55
70	11951.	2.141	0.647	3.61	12901.	2.425	0.580	3.09
	213.8		218.6					

1972	22							
25	12195.	2.292	0.380	2.02	12519.	2.466	0.335	1.70
30	14817.	2.359	0.288	1.81	15059.	2.505	0.250	1.50
35	17174.	2.401	0.215	1.54	17352.	2.529	0.182	1.25
40	19051.	2.417	0.162	1.27	19184.	2.535	0.132	1.00
45	20269.	2.411	0.127	1.07	20373.	2.523	0.098	0.79
50	20704.	2.384	0.110	0.95	20794.	2.495	0.082	0.68
55	20306.	2.341	0.110	0.95	20395.	2.450	0.082	0.68
60	19112.	2.283	0.126	1.06	19211.	2.390	0.099	0.80
65	17243.	2.216	0.158	1.23	17355.	2.316	0.133	0.99
70	14891.	2.141	0.205	1.42	15008.	2.229	0.182	1.23
	249.0		252.5					

1972	23							
25	9935.	2.292	0.690	2.99	9824.	2.255	0.698	3.04
30	12257.	2.359	0.507	2.63	12337.	2.390	0.500	2.58
35	14236.	2.401	0.366	2.17	14386.	2.472	0.351	2.04
40	15676.	2.417	0.269	1.74	15819.	2.503	0.250	1.58
45	16434.	2.411	0.214	1.46	16541.	2.488	0.197	1.31
50	16427.	2.384	0.202	1.39	16493.	2.434	0.191	1.29
55	15643.	2.341	0.230	1.54	15657.	2.350	0.228	1.52
60	14159.	2.283	0.300	1.86	14088.	2.245	0.308	1.93
65	12136.	2.216	0.409	2.24	11938.	2.130	0.428	2.40
70	9806.	2.141	0.557	2.55	9460.	2.011	0.586	2.76
	199.6		199.4					

1972	24							
20	6922.	2.199	0.676	2.14	6790.	2.139	0.706	2.24
25	8557.	2.292	0.525	1.96	8445.	2.237	0.550	2.08
30	10050.	2.359	0.413	1.76	9957.	2.308	0.435	1.88
35	11295.	2.401	0.342	1.61	11212.	2.351	0.364	1.74
40	12199.	2.417	0.311	1.57	12116.	2.365	0.334	1.71
45	12687.	2.411	0.320	1.69	12587.	2.354	0.346	1.85
50	12702.	2.384	0.368	1.96	12563.	2.317	0.399	2.16
55	12223.	2.341	0.453	2.37	12015.	2.257	0.491	2.61
60	11271.	2.283	0.574	2.83	10958.	2.178	0.622	3.13
65	9924.	2.216	0.728	3.26	9472.	2.084	0.789	3.59
70	8308.	2.141	0.915	3.55	7700.	1.977	0.990	3.86
	176.0		173.7					

1972	25							
20	8120.	2.199	0.474	1.75	8128.	2.203	0.473	1.75
25	9849.	2.292	0.339	1.46	9759.	2.232	0.350	1.53
30	11405.	2.359	0.237	1.15	11281.	2.257	0.256	1.28
35	12693.	2.401	0.169	0.89	12570.	2.275	0.192	1.06
40	13630.	2.417	0.132	0.75	13517.	2.283	0.157	0.93
45	14148.	2.411	0.129	0.76	14037.	2.279	0.153	0.94
50	14197.	2.384	0.157	0.93	14071.	2.261	0.180	1.12
55	13753.	2.341	0.216	1.27	13597.	2.225	0.237	1.45
60	12828.	2.283	0.306	1.72	12630.	2.174	0.326	1.90
65	11482.	2.216	0.426	2.21	11223.	2.103	0.447	2.38
70	9826.	2.141	0.575	2.64	9476.	2.013	0.599	2.82
	198.7		197.0					

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	
1972	26							
20	7105.	2.199	0.675	2.16	7046.	2.172	0.683	2.21
25	8677.	2.292	0.485	1.83	8598.	2.250	0.497	1.90
30	10065.	2.359	0.336	1.43	9982.	2.303	0.352	1.53
35	11187.	2.401	0.229	1.07	11112.	2.334	0.248	1.18
40	11981.	2.417	0.164	0.81	11916.	2.344	0.185	0.94
45	12400.	2.411	0.139	0.71	12341.	2.334	0.161	0.85
50	12411.	2.384	0.154	0.80	12346.	2.309	0.176	0.94
55	11997.	2.341	0.208	1.07	11919.	2.272	0.228	1.20
60	11168.	2.283	0.301	1.47	11079.	2.225	0.318	1.58
65	9974.	2.216	0.431	1.94	9889.	2.173	0.443	2.02
70	8507.	2.141	0.597	2.37	8450.	2.117	0.604	2.41
	174.7		173.5					
1972	27							
20	7418.	2.199	0.586	1.98	7351.	2.165	0.593	2.01
25	9170.	2.292	0.431	1.73	9117.	2.262	0.437	1.76
30	10745.	2.359	0.316	1.44	10716.	2.340	0.320	1.46
35	12021.	2.401	0.239	1.20	12015.	2.395	0.240	1.20
40	12904.	2.417	0.201	1.07	12914.	2.427	0.199	1.06
45	13315.	2.411	0.202	1.11	13338.	2.432	0.198	1.08
50	13210.	2.384	0.240	1.33	13241.	2.408	0.235	1.29
55	12576.	2.341	0.316	1.70	12602.	2.355	0.313	1.67
60	11454.	2.283	0.428	2.15	11440.	2.277	0.429	2.16
65	9940.	2.216	0.576	2.56	9825.	2.172	0.585	2.65
70	8182.	2.141	0.759	2.90	7895.	2.044	0.779	3.01
	185.1		184.6					
1972	28							
20	6543.	2.199	0.690	2.05	6198.	2.039	0.741	2.25
25	8160.	2.292	0.502	1.79	7967.	2.179	0.538	1.97
30	9685.	2.359	0.354	1.45	9553.	2.273	0.382	1.61
35	10953.	2.401	0.247	1.13	10861.	2.324	0.272	1.27
40	11899.	2.417	0.181	0.89	11822.	2.338	0.207	1.05
45	12452.	2.411	0.155	0.80	12373.	2.322	0.184	0.98
50	12563.	2.384	0.167	0.88	12465.	2.285	0.199	1.09
55	12203.	2.341	0.218	1.13	12076.	2.238	0.251	1.35
60	11385.	2.283	0.305	1.52	11233.	2.190	0.335	1.72
65	10164.	2.216	0.428	1.96	10025.	2.147	0.450	2.10
70	8647.	2.141	0.585	2.36	8595.	2.119	0.592	2.40
	167.2		164.2					
1972	29							
20	4331.	2.199	0.379	0.75	4507.	2.495	0.247	0.45
25	5427.	2.292	0.340	0.81	5677.	2.773	0.127	0.26
30	6529.	2.359	0.319	0.88	6819.	2.974	0.047	0.11
35	7553.	2.401	0.315	0.99	7882.	3.091	0.009	0.02
40	8410.	2.417	0.328	1.14	8802.	3.125	0.014	0.04
45	9013.	2.411	0.356	1.33	9499.	3.085	0.057	0.18
50	9292.	2.384	0.399	1.56	9877.	2.987	0.132	0.44
55	9210.	2.341	0.456	1.79	9857.	2.847	0.232	0.80
60	8766.	2.283	0.524	2.01	9405.	2.681	0.348	1.22
65	8004.	2.216	0.602	2.18	8553.	2.506	0.474	1.62
70	7003.	2.141	0.690	2.26	7404.	2.333	0.604	1.92
	119.2		125.2					
1972	30							
20	5507.	2.199	0.806	2.02	5284.	2.091	0.842	2.13
25	6930.	2.292	0.646	1.95	6923.	2.283	0.647	1.96
30	8224.	2.359	0.518	1.80	8339.	2.425	0.496	1.71
35	9271.	2.401	0.422	1.63	9422.	2.499	0.390	1.47
40	9976.	2.417	0.359	1.48	10112.	2.514	0.327	1.32
45	10278.	2.411	0.327	1.40	10372.	2.482	0.304	1.27
50	10148.	2.384	0.326	1.39	10185.	2.412	0.317	1.34
55	9598.	2.341	0.355	1.45	9566.	2.319	0.362	1.49
60	8683.	2.283	0.412	1.57	8571.	2.214	0.434	1.68
65	7496.	2.216	0.496	1.68	7309.	2.109	0.531	1.84
70	6158.	2.141	0.607	1.75	5924.	2.012	0.649	1.91
	140.3		140.3					

Table III.1.8(3)

Predicted Hours and Earnings by Occupation and Age, 1977

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1977	1							
25	11079.	2.292	0.714	3.45	10775.	2.209	0.786	3.83
30	13870.	2.359	0.667	3.92	13439.	2.257	0.754	4.49
35	16478.	2.401	0.631	4.33	15948.	2.288	0.727	5.07
40	18602.	2.417	0.605	4.65	18015.	2.302	0.703	5.50
45	19981.	2.411	0.587	4.87	19381.	2.298	0.684	5.76
50	20443.	2.384	0.576	4.94	19873.	2.279	0.667	5.81
55	19948.	2.341	0.569	4.85	19439.	2.244	0.652	5.65
60	18590.	2.283	0.562	4.58	18156.	2.195	0.638	5.27
65	16571.	2.216	0.554	4.14	16212.	2.135	0.623	4.73
70	14154.	2.141	0.541	3.57	13860.	2.064	0.606	4.07
	219.2		212.8					
1977	2							
25	10977.	2.292	1.215	5.82	10458.	2.206	1.324	6.27
30	14287.	2.359	1.199	7.26	13562.	2.264	1.321	7.91
35	17392.	2.401	1.141	8.26	16548.	2.304	1.264	9.08
40	19781.	2.417	1.037	8.49	18979.	2.328	1.151	9.39
45	21078.	2.411	0.887	7.75	20488.	2.339	0.979	8.57
50	21160.	2.384	0.685	6.08	20878.	2.340	0.742	6.62
55	20175.	2.341	0.429	3.70	20153.	2.335	0.437	3.77
60	18454.	2.283	0.115	0.93	18484.	2.327	0.060	0.47
65	16381.	2.216	-0.264	-1.95	16139.	2.319	-0.394	-2.74
70	14285.	2.141	-0.709	-4.73	13405.	2.314	-0.929	-5.38
	226.2		218.1					
1977	3							
25	10798.	2.292	0.711	3.35	10098.	2.105	0.865	4.15
30	14111.	2.359	0.680	4.07	13199.	2.162	0.844	5.15
35	16920.	2.401	0.555	3.91	16044.	2.208	0.715	5.19
40	18593.	2.417	0.335	2.58	18017.	2.239	0.483	3.89
45	18808.	2.411	0.019	0.15	18694.	2.248	0.154	1.28
50	17682.	2.384	-0.396	-2.94	18079.	2.230	-0.269	-2.18
55	15658.	2.341	-0.913	-6.11	16629.	2.180	-0.780	-5.95
60	13276.	2.283	-1.534	-8.92	15039.	2.096	-1.379	-9.89
65	10972.	2.216	-2.261	-11.20	14043.	1.976	-2.064	-14.66
70	9009.	2.141	-3.099	-13.04	14477.	1.624	-2.837	-22.51
	211.0		207.4					
1977	4							
25	12480.	2.292	0.697	3.79	12222.	2.226	0.727	3.99
30	15032.	2.359	0.586	3.73	14708.	2.276	0.624	4.03
35	17305.	2.401	0.508	3.66	16900.	2.296	0.556	4.09
40	19122.	2.417	0.464	3.67	18635.	2.294	0.521	4.23
45	20329.	2.411	0.453	3.82	19771.	2.276	0.515	4.47
50	20806.	2.384	0.472	4.12	20211.	2.251	0.534	4.79
55	20487.	2.341	0.521	4.56	19926.	2.225	0.575	5.15
60	19376.	2.283	0.599	5.08	18971.	2.207	0.634	5.45
65	17559.	2.216	0.703	5.57	17483.	2.202	0.709	5.63
70	15206.	2.141	0.832	5.91	15657.	2.219	0.796	5.62
	235.1		229.7					
1977	5							
30	16551.	2.359	0.968	6.79	16714.	2.384	0.944	6.62
35	20270.	2.401	0.740	6.25	20639.	2.463	0.677	5.67
40	23585.	2.417	0.566	5.52	24014.	2.502	0.480	4.61
45	26245.	2.411	0.445	4.84	26646.	2.505	0.350	3.72
50	28031.	2.384	0.374	4.40	28379.	2.476	0.282	3.23
55	28769.	2.341	0.350	4.31	29071.	2.421	0.269	3.23
60	28353.	2.283	0.370	4.60	28619.	2.347	0.305	3.72
65	26777.	2.216	0.430	5.20	26999.	2.261	0.384	4.59
70	24159.	2.141	0.527	5.95	24316.	2.168	0.500	5.60
	254.0		257.1					

Table III.1.8(3), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1977	6							
25	11659.	2.292	1.232	6.27	9438.	1.967	1.523	7.31
30	15186.	2.359	1.278	8.23	12783.	2.087	1.522	9.32
35	18527.	2.401	1.245	9.60	16103.	2.164	1.456	10.84
40	21108.	2.417	1.131	9.87	18786.	2.199	1.326	11.33
45	22514.	2.411	0.934	8.72	20408.	2.192	1.130	10.52
50	22641.	2.384	0.653	6.20	20930.	2.150	0.863	8.40
55	21700.	2.341	0.284	2.63	20681.	2.078	0.519	5.17
60	20098.	2.283	-0.175	-1.54	20205.	1.983	0.093	0.95
65	18270.	2.216	-0.728	-6.01	20108.	1.873	-0.422	-4.53
70	16577.	2.141	-1.378	-10.67	21050.	1.754	-1.032	-12.38
	232.2		208.2					
1977	7							
25	12655.	2.292	0.677	3.74	11773.	2.092	0.901	5.07
30	14813.	2.359	0.392	2.46	14031.	2.127	0.652	4.30
35	16560.	2.401	0.153	1.05	16048.	2.156	0.427	3.17
40	17842.	2.417	-0.041	-0.30	17661.	2.175	0.229	1.86
45	18644.	2.411	-0.192	-1.48	18760.	2.182	0.064	0.55
50	18969.	2.384	-0.303	-2.41	19294.	2.173	-0.066	-0.59
55	18825.	2.341	-0.378	-3.04	19268.	2.145	-0.158	-1.42
60	18227.	2.283	-0.420	-3.35	18723.	2.095	-0.210	-1.87
65	17205.	2.216	-0.433	-3.36	17715.	2.025	-0.219	-1.92
70	15804.	2.141	-0.421	-3.11	16302.	1.931	-0.186	-1.57
	227.9		222.6					
1977	8							
25	9072.	2.292	0.396	1.57	8697.	2.101	0.573	2.37
30	12475.	2.359	0.371	1.96	12389.	2.318	0.410	2.19
35	16006.	2.401	0.356	2.37	16070.	2.429	0.330	2.18
40	19162.	2.417	0.348	2.76	19244.	2.448	0.320	2.51
45	21412.	2.411	0.347	3.08	21390.	2.404	0.353	3.14
50	22344.	2.384	0.349	3.27	22146.	2.328	0.401	3.81
55	21792.	2.341	0.351	3.27	21467.	2.253	0.433	4.13
60	19888.	2.283	0.351	3.06	19619.	2.205	0.424	3.78
65	17010.	2.216	0.345	2.65	16995.	2.210	0.351	2.70
70	13660.	2.141	0.331	2.11	13913.	2.298	0.185	1.12
	206.2		205.0					
1977	9							
25	9822.	2.292	0.963	4.13	9096.	2.124	1.051	4.50
30	11721.	2.359	0.699	3.47	11037.	2.177	0.795	4.03
35	13274.	2.401	0.519	2.87	12644.	2.205	0.622	3.57
40	14416.	2.417	0.422	2.52	13812.	2.210	0.531	3.32
45	15086.	2.411	0.408	2.55	14452.	2.198	0.520	3.42
50	15218.	2.384	0.475	3.03	14487.	2.173	0.586	3.91
55	14749.	2.341	0.622	3.92	13884.	2.140	0.727	4.71
60	13646.	2.283	0.846	5.05	12684.	2.104	0.940	5.67
65	11955.	2.216	1.146	6.18	11018.	2.068	1.223	6.52
70	9822.	2.141	1.520	6.97	9099.	2.038	1.574	7.03
	192.3		181.1					
1977	10							
30	23155.	2.359	0.376	3.69	22865.	2.288	0.439	4.38
35	26464.	2.401	0.141	1.56	26419.	2.374	0.164	1.83
40	29132.	2.417	-0.035	-0.43	29136.	2.405	-0.026	-0.31
45	31081.	2.411	-0.155	-2.00	31121.	2.390	-0.137	-1.79
50	32231.	2.384	-0.221	-2.99	32365.	2.336	-0.179	-2.48
55	32496.	2.341	-0.236	-3.27	32737.	2.255	-0.162	-2.35
60	31790.	2.283	-0.202	-2.81	32053.	2.160	-0.095	-1.41
65	30073.	2.216	-0.122	-1.65	30191.	2.060	0.013	0.19
70	27385.	2.141	0.001	0.01	27201.	1.964	0.154	2.13
	317.9		316.5					

$\eta_{G,P}$

Table III.1.8(3), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1977	11							
30	20976.	2.359	-0.092	-0.82	19052.	3.250	-0.533	-3.12
35	25969.	2.401	0.183	1.98	26242.	2.960	-0.093	-0.82
40	30572.	2.417	0.386	4.91	32013.	2.839	0.179	2.02
45	33967.	2.411	0.521	7.33	36269.	2.815	0.321	4.13
50	35524.	2.384	0.580	8.64	38531.	2.832	0.359	4.88
55	35039.	2.341	0.565	8.46	38170.	2.835	0.321	4.32
60	32772.	2.283	0.474	6.80	35121.	2.773	0.232	2.93
65	29307.	2.216	0.304	4.03	30316.	2.599	0.115	1.34
70	25317.	2.141	0.055	0.66	25349.	2.292	-0.019	-0.21
	307.9		312.4					
1977	12							
25	7233.	2.292	0.558	1.76	7616.	2.557	0.381	1.13
30	7937.	2.359	0.509	1.71	8388.	2.717	0.269	0.83
35	8483.	2.401	0.485	1.71	9008.	2.883	0.161	0.50
40	8847.	2.417	0.485	1.78	9442.	3.040	0.067	0.21
45	9009.	2.411	0.508	1.90	9687.	3.168	-0.001	-0.00
50	8958.	2.384	0.552	2.07	9758.	3.245	-0.027	-0.08
55	8690.	2.341	0.615	2.28	9672.	3.254	0.001	0.00
60	8216.	2.283	0.695	2.50	9409.	3.174	0.096	0.28
65	7561.	2.216	0.789	2.69	8899.	2.998	0.262	0.78
70	6766.	2.141	0.895	2.83	8027.	2.728	0.500	1.47
	102.5		110.4					
1977	13							
25	8322.	2.292	0.763	2.77	9080.	2.647	0.440	1.51
30	9837.	2.359	0.676	2.82	10503.	2.663	0.399	1.57
35	11228.	2.401	0.669	3.13	11857.	2.647	0.444	1.99
40	12423.	2.417	0.741	3.81	13037.	2.601	0.573	2.87
45	13323.	2.411	0.891	4.92	13872.	2.530	0.782	4.29
50	13799.	2.384	1.116	6.46	14144.	2.439	1.066	6.18
55	13719.	2.341	1.413	8.28	13648.	2.332	1.421	8.31
60	12990.	2.283	1.779	10.12	12293.	2.215	1.842	10.22
65	11612.	2.216	2.212	11.59	10183.	2.091	2.326	11.33
70	9710.	2.141	2.708	12.28	7645.	1.965	2.868	11.16
	164.1		172.2					
1977	14							
25	8334.	2.292	0.472	1.72	7668.	1.994	0.720	2.77
30	10634.	2.359	0.255	1.15	10222.	2.114	0.460	2.22
35	12730.	2.401	0.080	0.43	12539.	2.194	0.253	1.44
40	14396.	2.417	-0.053	-0.31	14372.	2.239	0.096	0.61
45	15451.	2.411	-0.146	-0.93	15534.	2.255	-0.016	-0.11
50	15773.	2.384	-0.201	-1.33	15905.	2.252	-0.091	-0.64
55	15324.	2.341	-0.221	-1.45	15449.	2.235	-0.134	-0.93
60	14154.	2.283	-0.209	-1.30	14230.	2.217	-0.154	-0.99
65	12406.	2.216	-0.168	-0.94	12417.	2.203	-0.157	-0.89
70	10292.	2.141	-0.099	-0.48	10255.	2.203	-0.151	-0.70
	167.1		163.5					
1977	15							
30	10616.	2.359	0.751	3.38	10784.	2.410	0.733	3.28
35	13383.	2.401	0.577	3.22	14128.	2.659	0.485	2.58
40	15993.	2.417	0.453	3.00	16848.	2.759	0.331	2.02
45	18214.	2.411	0.378	2.85	18982.	2.743	0.260	1.80
50	19809.	2.384	0.351	2.91	20476.	2.660	0.252	1.94
55	20569.	2.341	0.370	3.25	21194.	2.562	0.292	2.41
60	20347.	2.283	0.436	3.88	21078.	2.495	0.360	3.04
65	19102.	2.216	0.546	4.70	20287.	2.502	0.444	3.60
70	16941.	2.141	0.699	5.53	19224.	2.630	0.525	3.84
	170.3		176.8					

Table III.1.8(3), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1977	16							
25	9160.	2.292	0.486	1.94	9057.	2.241	0.522	2.11
30	10905.	2.359	0.286	1.32	10811.	2.294	0.331	1.56
35	12358.	2.401	0.167	0.86	12286.	2.329	0.216	1.14
40	13434.	2.417	0.129	0.71	13370.	2.344	0.179	1.02
45	14045.	2.411	0.170	0.99	13962.	2.339	0.220	1.31
50	14104.	2.384	0.289	1.71	13972.	2.314	0.338	2.04
55	13540.	2.341	0.484	2.80	13329.	2.270	0.533	3.13
60	12339.	2.283	0.752	4.06	12016.	2.207	0.804	4.38
65	10583.	2.216	1.090	5.21	10111.	2.127	1.151	5.47
70	8462.	2.141	1.498	5.92	7813.	2.032	1.572	6.04
	165.4		163.6					
1977	17							
25	9519.	2.292	0.697	2.89	8735.	2.041	0.782	3.35
30	11790.	2.359	0.547	2.74	11200.	2.160	0.615	3.19
35	13849.	2.401	0.423	2.44	13418.	2.239	0.478	2.87
40	15510.	2.417	0.324	2.08	15191.	2.277	0.371	2.48
45	16626.	2.411	0.248	1.71	16375.	2.279	0.293	2.11
50	17096.	2.384	0.196	1.41	16880.	2.250	0.242	1.81
55	16879.	2.341	0.166	1.20	16675.	2.195	0.215	1.63
60	15999.	2.283	0.156	1.10	15790.	2.125	0.210	1.56
65	14549.	2.216	0.167	1.10	14319.	2.043	0.225	1.58
70	12673.	2.141	0.196	1.16	12416.	1.957	0.259	1.64
	196.3		188.1					
1977	18							
25	8777.	2.292	0.684	2.62	8090.	2.077	0.966	3.76
30	10805.	2.359	0.712	3.26	9708.	2.092	1.062	4.93
35	12671.	2.401	0.721	3.80	11295.	2.116	1.094	5.84
40	14123.	2.417	0.709	4.14	12673.	2.141	1.071	6.34
45	14959.	2.411	0.673	4.18	13636.	2.160	1.003	6.33
50	15088.	2.384	0.610	3.86	14013.	2.163	0.901	5.84
55	14551.	2.341	0.517	3.21	13742.	2.143	0.776	4.97
60	13489.	2.283	0.387	2.29	12900.	2.093	0.636	3.92
65	12102.	2.216	0.218	1.19	11685.	2.008	0.490	2.85
70	10589.	2.141	0.004	0.02	10354.	1.884	0.340	1.87
	182.9		167.6					
1977	19							
25	11428.	2.292	0.532	2.65	11423.	2.290	0.532	2.65
30	14681.	2.359	0.590	3.67	14580.	2.332	0.589	3.68
35	17894.	2.401	0.616	4.59	17714.	2.362	0.614	4.60
40	20654.	2.417	0.606	5.19	20444.	2.377	0.606	5.21
45	22578.	2.411	0.568	5.32	22390.	2.376	0.566	5.34
50	23421.	2.384	0.495	4.86	23281.	2.355	0.494	4.88
55	23132.	2.341	0.389	3.85	23032.	2.315	0.388	3.86
60	21847.	2.283	0.251	2.40	21772.	2.252	0.250	2.42
65	19831.	2.216	0.081	0.73	19797.	2.168	0.079	0.72
70	17396.	2.141	-0.121	-0.98	17475.	2.063	-0.124	-1.05
	243.0		241.5					
1977	20							
25	11902.	2.292	0.594	3.08	11642.	2.212	0.645	3.39
30	14776.	2.359	0.509	3.19	14625.	2.314	0.538	3.40
35	17499.	2.401	0.450	3.28	17447.	2.385	0.460	3.36
40	19828.	2.417	0.417	3.42	19869.	2.429	0.409	3.34
45	21534.	2.411	0.408	3.64	21672.	2.450	0.383	3.39
50	22428.	2.384	0.421	3.96	22683.	2.453	0.378	3.49
55	22397.	2.341	0.455	4.36	22808.	2.444	0.390	3.64
60	21430.	2.283	0.508	4.77	22047.	2.428	0.416	3.78
65	19623.	2.216	0.577	5.11	20503.	2.412	0.453	3.85
70	17176.	2.141	0.661	5.30	18361.	2.402	0.495	3.78
	224.0		224.7					

Table III.1.8(3), continued

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y,H}$	W_m
1977	21							
25	9997.	2.292	0.647	2.82	10204.	2.368	0.609	2.62
30	12326.	2.359	0.563	2.94	12616.	2.464	0.511	2.61
35	14457.	2.401	0.494	2.97	14758.	2.509	0.440	2.59
40	16179.	2.417	0.439	2.94	16437.	2.511	0.393	2.57
45	17314.	2.411	0.399	2.86	17502.	2.480	0.364	2.57
50	17744.	2.384	0.370	2.75	17861.	2.428	0.348	2.56
55	17434.	2.341	0.352	2.62	17501.	2.357	0.339	2.51
60	16431.	2.283	0.344	2.47	16488.	2.307	0.332	2.37
65	14862.	2.216	0.342	2.30	14955.	2.258	0.321	2.13
70	12902.	2.141	0.347	2.09	13071.	2.228	0.303	1.78
	207.7		210.9					
1977	22							
25	11163.	2.292	0.697	3.39	11482.	2.392	0.625	3.00
30	13653.	2.359	0.561	3.25	13900.	2.440	0.503	2.87
35	15899.	2.401	0.452	2.99	16095.	2.471	0.402	2.62
40	17708.	2.417	0.369	2.70	17870.	2.482	0.322	2.32
45	18922.	2.411	0.310	2.43	19063.	2.474	0.264	2.04
50	19437.	2.384	0.273	2.22	19563.	2.445	0.228	1.82
55	19212.	2.341	0.256	2.10	19324.	2.400	0.213	1.72
60	18275.	2.283	0.257	2.05	18372.	2.335	0.220	1.73
65	16726.	2.216	0.273	2.06	16798.	2.253	0.246	1.83
70	14719.	2.141	0.301	2.07	14750.	2.155	0.291	1.99
	231.2		234.9					
1977	23							
25	10105.	2.292	0.756	3.33	9859.	2.221	0.810	3.60
30	12305.	2.359	0.666	3.48	12342.	2.370	0.658	3.43
35	14241.	2.401	0.600	3.56	14450.	2.462	0.554	3.25
40	15714.	2.417	0.557	3.62	15983.	2.496	0.497	3.18
45	16564.	2.411	0.535	3.66	16793.	2.477	0.485	3.29
50	16699.	2.384	0.533	3.73	16794.	2.410	0.513	3.57
55	16109.	2.341	0.547	3.77	15980.	2.307	0.573	3.97
60	14871.	2.283	0.576	3.75	14444.	2.178	0.657	4.35
65	13135.	2.216	0.617	3.66	12378.	2.033	0.757	4.61
70	11097.	2.141	0.667	3.46	10042.	1.880	0.866	4.63
	202.7		201.5					
1977	24							
20	6926.	2.199	0.835	2.63	6343.	1.997	0.992	3.15
25	8698.	2.292	0.818	3.10	8159.	2.132	0.943	3.61
30	10416.	2.359	0.810	3.58	9936.	2.233	0.908	4.04
35	11903.	2.401	0.812	4.02	11474.	2.300	0.891	4.44
40	12977.	2.417	0.823	4.42	12575.	2.330	0.891	4.81
45	13505.	2.411	0.842	4.71	13090.	2.325	0.907	5.11
50	13420.	2.384	0.866	4.87	12946.	2.291	0.938	5.30
55	12743.	2.341	0.893	4.86	12171.	2.229	0.980	5.35
60	11573.	2.283	0.920	4.66	10883.	2.144	1.029	5.22
65	10066.	2.216	0.945	4.29	9265.	2.042	1.081	4.91
70	8396.	2.141	0.966	3.79	7520.	1.927	1.132	4.42
	182.5		173.3					
1977	25							
20	8244.	2.199	0.944	3.54	8045.	2.144	0.975	3.66
25	10185.	2.292	0.744	3.30	9772.	2.173	0.811	3.64
30	11937.	2.359	0.589	2.98	11430.	2.203	0.677	3.51
35	13392.	2.401	0.478	2.67	12878.	2.229	0.575	3.32
40	14465.	2.417	0.413	2.47	13985.	2.247	0.509	3.17
45	15090.	2.411	0.390	2.44	14649.	2.252	0.479	3.12
50	15216.	2.384	0.408	2.61	14796.	2.240	0.490	3.23
55	14817.	2.341	0.467	2.96	14387.	2.208	0.542	3.53
60	13899.	2.283	0.563	3.43	13414.	2.152	0.637	3.97
65	12519.	2.216	0.696	3.93	11909.	2.070	0.778	4.47
70	10785.	2.141	0.863	4.35	9961.	1.962	0.963	4.89
	208.7		201.4					

Table III.1.8(3), concluded

	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y.H}$	W_m	$Y_{\bar{H}}$	$\bar{H}$	$\eta_{Y.H}$	W_m
1977	26							
20	7606.	2.199	1.004	3.47	7218.	2.092	1.088	3.75
25	9328.	2.292	0.851	3.46	8919.	2.180	0.938	3.84
30	10902.	2.359	0.732	3.38	10467.	2.239	0.826	3.86
35	12217.	2.401	0.648	3.30	11754.	2.272	0.749	3.87
40	13186.	2.417	0.597	3.26	12691.	2.280	0.705	3.92
45	13740.	2.411	0.579	3.30	13215.	2.268	0.691	4.02
50	13837.	2.384	0.590	3.43	13289.	2.240	0.703	4.17
55	13466.	2.341	0.629	3.62	12913.	2.202	0.738	4.33
60	12653.	2.283	0.694	3.84	12130.	2.157	0.792	4.45
65	11462.	2.216	0.780	4.04	11017.	2.111	0.861	4.49
70	9994.	2.141	0.886	4.14	9681.	2.068	0.943	4.42
	191.0		183.1					
1977	27							
20	7721.	2.199	0.912	3.20	7847.	2.239	0.890	3.12
25	9595.	2.292	0.785	3.28	9751.	2.341	0.758	3.16
30	11315.	2.359	0.687	3.29	11520.	2.424	0.652	3.10
35	12734.	2.401	0.619	3.28	12988.	2.482	0.575	3.01
40	13728.	2.417	0.581	3.30	14016.	2.510	0.530	2.96
45	14206.	2.411	0.570	3.36	14499.	2.503	0.520	3.01
50	14124.	2.384	0.586	3.47	14371.	2.458	0.546	3.19
55	13487.	2.341	0.627	3.61	13609.	2.375	0.608	3.49
60	12357.	2.283	0.691	3.74	12245.	2.254	0.707	3.84
65	10846.	2.216	0.776	3.80	10377.	2.098	0.841	4.16
70	9103.	2.141	0.881	3.75	8164.	1.913	1.006	4.31
	195.8		198.7					
1977	28							
20	7393.	2.199	0.770	2.59	6865.	2.011	0.895	3.05
25	9133.	2.292	0.708	2.82	8796.	2.179	0.784	3.16
30	10788.	2.359	0.664	3.04	10583.	2.294	0.708	3.27
35	12213.	2.401	0.638	3.24	12062.	2.356	0.668	3.42
40	13272.	2.417	0.628	3.45	13099.	2.369	0.661	3.65
45	13857.	2.411	0.634	3.64	13593.	2.341	0.680	3.95
50	13909.	2.384	0.653	3.81	13506.	2.284	0.720	4.26
55	13425.	2.341	0.684	3.92	12867.	2.208	0.772	4.50
60	12460.	2.283	0.725	3.95	11777.	2.124	0.831	4.61
65	11122.	2.216	0.772	3.86	10382.	2.040	0.889	4.53
70	9548.	2.141	0.825	3.68	8847.	1.964	0.942	4.24
	186.4		180.4					
1977	29							
20	4995.	2.199	0.513	1.17	5350.	2.623	0.259	0.53
25	6122.	2.292	0.525	1.40	6634.	2.867	0.179	0.41
30	7217.	2.359	0.541	1.65	7877.	3.039	0.133	0.34
35	8175.	2.401	0.562	1.91	8977.	3.135	0.120	0.34
40	8889.	2.417	0.586	2.16	9825.	3.161	0.139	0.43
45	9276.	2.411	0.614	2.36	10317.	3.128	0.183	0.60
50	9293.	2.384	0.642	2.50	10383.	3.048	0.244	0.83
55	8937.	2.341	0.670	2.56	10008.	2.939	0.311	1.06
60	8258.	2.283	0.696	2.52	9246.	2.813	0.378	1.24
65	7339.	2.216	0.716	2.37	8203.	2.684	0.434	1.33
70	6282.	2.141	0.730	2.14	7009.	2.564	0.475	1.30
	127.5		139.9					
1977	30							
20	5721.	2.199	0.815	2.12	5180.	1.968	0.974	2.57
25	6971.	2.292	0.768	2.34	6709.	2.186	0.842	2.58
30	8135.	2.359	0.733	2.53	8102.	2.345	0.742	2.56
35	9106.	2.401	0.708	2.69	9219.	2.444	0.679	2.56
40	9789.	2.417	0.695	2.81	9952.	2.477	0.653	2.62
45	10117.	2.411	0.690	2.90	10235.	2.453	0.661	2.76
50	10061.	2.384	0.693	2.92	10047.	2.380	0.696	2.94
55	9635.	2.341	0.701	2.88	9424.	2.270	0.749	3.11
60	8896.	2.283	0.711	2.77	8458.	2.137	0.812	3.22
65	7926.	2.216	0.722	2.58	7277.	1.992	0.877	3.21
70	6824.	2.141	0.732	2.33	6022.	1.844	0.937	3.06
	140.3		137.4					

(1) Accountants	16 years	(16) Oth. teachers	16 years
(2) Architects	16	(17) Writers, et al.	14
(3) Computer spec.	16	(18) Public admin.	14
(4) Engineers	16	(19) Bank officers	16
(5) Lawyers	19	(20) Hlth & ed admin.	18
(6) Librar., soc. sc.	18	(21) Managers (trade)	14
(7) Math spec.	16	(22) Oth. manag. & ad.	14
(8) Life & phy. sc.	18	(23) Sales	14
(9) Eng. & sc. tech.	14	(24) Clerical	12
(10) Hlth prof.	19	(25) Crafts	12
(11) Physicians	20	(26) Operatives	12
(12) Clergy	18	(27) Trans. oper.	12
(13) Hlth. tech.	14	(28) Laborers (ex farm)	12
(14) Oth. tech.	16	(29) Farm laborers	12
(15) College faculty	20	(30) Service	12

Sector of employment is also specified as the mode. Private (nongovernmental) nonselfemployment is stipulated, with the following exceptions:

(5) Lawyers	Selfemployment
(6) Librarians, soc. sc.	State- local government employment
(10) Health prof.	Selfemployment
(11) Physicians	Selfemployment
(14) Other technicians	State- local government employment
(15) College faculty	State- local government employment
(16) Other teachers	State- local government employment
(18) Public administrators	State- local government employment
(20) Hlth., ed. admin.	State- local government employment

Finally, SMSA but non- central- city residence is assumed.

In the evaluation of the hours function, in addition to the values of the schooling, employment (self- and government-) and SMSA residence variables specified for the earnings equation, the individual is specified to be married to a nonworking spouse and to have no children. However, as an examination of the individual coefficients will indicate, predicted hours would change only slightly if the family composition variables were altered.

The relationship between hours and earnings can be summarized by the elasticities at age 45, evaluating these at mean predicted hours for the occupations.

	1967	1972	1977
(1) Accountants	.32	.45	.68
(2) Architects		.51	.98
(3) Computer spec.		.01	.15
(4) Engineers	.22	.18	.52
(5) Lawyers	.23	.35	.35
(6) Librar., soc. sc.	.18	.66	1.13
(7) Math spec.		.10	.06
(8) Life & phy. sc.	-.01	.26	.35
(9) Eng. & sc. tech.	.09	.07	.52
(10) Hlth prof.	.12	.04	-.14
(11) Physicians	.05	-.15	.32
(12) Clergy	-.59	-.34	.00
(13) Hlth. tech.	.60	.00	.78
(14) Oth. tech.	-.11	-.10	-.02
(15) College faculty	.38	.07	.26
(16) Oth. teachers	.09	-.00	.22
(17) Writers, et al.	.15	.37	.29
(18) Public admin.	.09	.27	1.00
(19) Bank officers		.52	.57
(20) Hlth & ed admin.		.16	.38
(21) Managers (trade)	.29	.08	.36
(22) Oth. manag. & ad.	.13	.10	.26
(23) Sales	.24	.20	.49
(24) Clerical	.11	.35	.91
(25) Crafts	.16	.15	.48
(26) Operatives	.23	.16	.69
(27) Trans. oper.	.28	.20	.52
(28) Laborers (ex farm)	.13	.18	.68
(29) Farm laborers	.06	.06	.18
(30) Service	.31	.30	.66

As can be observed, the hours- earnings elasticities tend to be substantially higher in 1977 than in the earlier two years. In all years the elasticities are generally higher in the nonprofessional occupations than in the professional and related occupations. These findings are consistent with the expectation that elasticities of demand for the individual's services are likely to be substantially lower in the more human- capital- intensive occupations. Rising elasticities over time are indicative of increased competition in all occupations, the result of the increased rate of growth of the supply of new entrants, especially in the professional occupations.

The relationship between earnings and experience is summarized in Table III.1.9, which presents predicted earnings at predicted mean hours in the occupation, at ages 35, 50 and 60 in each year. This table also presents the ratios of earnings at age 35 and 65 to earnings at age 50 in each year and percentage growth in earnings at ages 35, 50 and 60 over ten year period and over the two five- year subperiods.

Consider, first, the growth of earnings over the earlier phase of the career. In all years the ratio of earnings at age 35 to earnings at age 50 is

Table III.1.9

Earnings at Ages 35, 50, and 65 by Occupation and Year

		Earnings			Relative Change		
1		1967	1972	1977	67-72	72-77	67-77
	35	13714.	17606.	15948.	0.28	-0.09	0.16
	50	15694.	21596.	19873.	0.38	-0.08	0.27
	65	13276.	17044.	16212.	0.28	-0.05	0.22
	35/50	0.87	0.82	0.80			
	65/50	0.85	0.79	0.82			
2		1967	1972	1977	67-72	72-77	67-77
	35	0.	20428.	16548.	0.0	-0.19	0.0
	50	0.	25499.	20878.	0.0	-0.18	0.0
	65	0.	21862.	16139.	0.0	-0.26	0.0
	35/50	0.0	0.80	0.79			
	65/50	0.0	0.86	0.77			
3		1967	1972	1977	67-72	72-77	67-77
	35	0.	15969.	16044.	0.0	0.00	0.0
	50	0.	19016.	18079.	0.0	-0.05	0.0
	65	0.	15002.	14043.	0.0	-0.06	0.0
	35/50	0.0	0.84	0.89			
	65/50	0.0	0.79	0.78			
4		1967	1972	1977	67-72	72-77	67-77
	35	15977.	16820.	16900.	0.05	0.00	0.06
	50	18441.	20093.	20211.	0.09	0.01	0.10
	65	15270.	16598.	17483.	0.09	0.05	0.14
	35/50	0.87	0.84	0.84			
	65/50	0.83	0.83	0.87			
5		1967	1972	1977	67-72	72-77	67-77
	35	23772.	26153.	20639.	0.10	-0.21	-0.13
	50	29294.	34309.	28379.	0.17	-0.17	-0.03
	65	26793.	25740.	26999.	-0.04	0.05	0.01
	35/50	0.81	0.76	0.73			
	65/50	0.91	0.75	0.95			
6		1967	1972	1977	67-72	72-77	67-77
	35	14224.	19619.	16103.	0.38	-0.18	0.13
	50	18820.	26671.	20930.	0.42	-0.22	0.11
	65	15375.	24116.	20108.	0.57	-0.17	0.31
	35/50	0.76	0.74	0.77			
	65/50	0.82	0.90	0.96			

Table III.1.9, continued

	Earnings			Relative Change		
7	1967	1972	1977	67-72	72-77	67-77
35	0.	17351.	16048.	0.0	-0.08	0.0
50	0.	21286.	19294.	0.0	-0.09	0.0
65	0.	17562.	17715.	0.0	0.01	0.0
35/50	0.0	0.82	0.83			
65/50	0.0	0.83	0.92			
8	1967	1972	1977	67-72	72-77	67-77
35	15590.	16335.	16070.	0.05	-0.02	0.03
50	18388.	21040.	22146.	0.14	0.05	0.20
65	14628.	18557.	16995.	0.27	-0.08	0.16
35/50	0.85	0.78	0.73			
65/50	0.80	0.88	0.77			
9	1967	1972	1977	67-72	72-77	67-77
35	11927.	12641.	12644.	0.06	0.00	0.06
50	13722.	15526.	14467.	0.13	-0.07	0.06
65	11431.	12584.	11016.	0.10	-0.12	-0.04
35/50	0.87	0.81	0.87			
65/50	0.83	0.81	0.76			
10	1967	1972	1977	67-72	72-77	67-77
35	22075.	23593.	26419.	0.07	0.12	0.20
50	25518.	29428.	32365.	0.15	0.10	0.27
65	20989.	23202.	30191.	0.11	0.30	0.44
35/50	0.87	0.80	0.82			
65/50	0.82	0.79	0.93			
11	1967	1972	1977	67-72	72-77	67-77
35	24011.	26186.	26242.	0.09	0.00	0.09
50	39918.	41311.	38531.	0.03	-0.07	-0.03
65	28326.	32774.	30316.	0.16	-0.08	0.07
35/50	0.60	0.63	0.68			
65/50	0.71	0.79	0.79			
12	1967	1972	1977	67-72	72-77	67-77
35	8587.	9079.	9008.	0.06	-0.01	0.05
50	8853.	9738.	9758.	0.10	0.00	0.10
65	7134.	6364.	8899.	-0.11	0.40	0.25
35/50	0.97	0.93	0.92			
65/50	0.81	0.65	0.91			
13	1967	1972	1977	67-72	72-77	67-77
35	11430.	12547.	11857.	0.10	-0.05	0.04
50	13263.	13512.	14144.	0.02	0.05	0.07
65	10959.	9038.	10183.	-0.18	0.13	-0.07
35/50	0.86	0.93	0.84			
65/50	0.83	0.67	0.72			
14	1967	1972	1977	67-72	72-77	67-77
35	13522.	14548.	12539.	0.08	-0.14	-0.07
50	16582.	18663.	15905.	0.13	-0.15	-0.04
65	13731.	14040.	12417.	0.02	-0.12	-0.10
35/50	0.82	0.78	0.79			
65/50	0.83	0.75	0.78			

Table III.1.9, continued

			Earnings			Relative Change	
15		1967	1972	1977	67-72	72-77	67-77
	35	13726.	14204.	14126.	0.03	-0.01	0.03
	50	19901.	21217.	20476.	0.07	-0.03	0.03
	65	17533.	18715.	20287.	0.07	0.08	0.16
	35/50	0.69	0.67	0.69			
	65/50	0.88	0.88	0.99			
16		1967	1972	1977	67-72	72-77	67-77
	35	10764.	11910.	12286.	0.11	0.03	0.14
	50	12411.	13834.	13972.	0.11	0.01	0.13
	65	9873.	11779.	10111.	0.19	-0.14	0.02
	35/50	0.87	0.86	0.88			
	65/50	0.80	0.85	0.72			
17		1967	1972	1977	67-72	72-77	67-77
	35	13625.	15374.	13418.	0.13	-0.13	-0.02
	50	15720.	19050.	16880.	0.21	-0.11	0.07
	65	11489.	15040.	14319.	0.31	-0.05	0.25
	35/50	0.87	0.81	0.79			
	65/50	0.73	0.79	0.85			
18		1967	1972	1977	67-72	72-77	67-77
	35	12033.	12245.	11295.	0.02	-0.08	-0.06
	50	14044.	14505.	14013.	0.03	-0.03	-0.00
	65	12800.	12658.	11685.	-0.01	-0.08	-0.09
	35/50	0.86	0.84	0.81			
	65/50	0.91	0.87	0.83			
19		1967	1972	1977	67-72	72-77	67-77
	35	0.	17961.	17714.	0.0	-0.01	0.0
	50	0.	24136.	23281.	0.0	-0.04	0.0
	65	0.	21439.	19797.	0.0	-0.08	0.0
	35/50	0.0	0.74	0.76			
	65/50	0.0	0.89	0.85			
20		1967	1972	1977	67-72	72-77	67-77
	35	0.	17374.	17447.	0.0	0.00	0.0
	50	0.	21879.	22683.	0.0	0.04	0.0
	65	0.	20246.	20503.	0.0	0.01	0.0
	35/50	0.0	0.79	0.77			
	65/50	0.0	0.93	0.90			
21		1967	1972	1977	67-72	72-77	67-77
	35	12986.	15202.	14758.	0.17	-0.03	0.14
	50	15367.	18071.	17661.	0.18	-0.01	0.16
	65	14239.	14817.	14955.	0.04	0.01	0.05
	35/50	0.85	0.84	0.83			
	65/50	0.93	0.82	0.84			
22		1967	1972	1977	67-72	72-77	67-77
	35	15313.	17352.	16095.	0.13	-0.07	0.05
	50	18069.	20794.	19563.	0.15	-0.06	0.08
	65	15173.	17355.	16796.	0.14	-0.03	0.11
	35/50	0.85	0.83	0.82			
	65/50	0.84	0.83	0.86			

Table III.1.9, concluded

		Earnings			Relative Change		
23		1967	1972	1977	67-72	72-77	67-77
	35	12824.	14386.	14450.	0.12	0.00	0.13
	50	14195.	16453.	16794.	0.16	0.02	0.18
	65	10497.	11938.	12376.	0.14	0.04	0.18
	35/50	0.90	0.87	0.86			
	65/50	0.74	0.72	0.74			
24		1967	1972	1977	67-72	72-77	67-77
	35	9892.	11212.	11474.	0.13	0.02	0.16
	50	10715.	12563.	12946.	0.17	0.03	0.21
	65	8406.	9472.	9265.	0.13	-0.02	0.10
	35/50	0.92	0.89	0.89			
	65/50	0.78	0.75	0.72			
25		1967	1972	1977	67-72	72-77	67-77
	35	10954.	12570.	12878.	0.15	0.02	0.18
	50	12139.	14071.	14796.	0.16	0.05	0.22
	65	10534.	11223.	11909.	0.07	0.06	0.13
	35/50	0.90	0.89	0.87			
	65/50	0.87	0.80	0.80			
26		1967	1972	1977	67-72	72-77	67-77
	35	9679.	11112.	11754.	0.15	0.06	0.21
	50	10706.	12346.	13289.	0.15	0.08	0.24
	65	9359.	9889.	11017.	0.06	0.11	0.18
	35/50	0.90	0.90	0.88			
	65/50	0.87	0.80	0.83			
27		1967	1972	1977	67-72	72-77	67-77
	35	10784.	12015.	12988.	0.11	0.08	0.20
	50	11977.	13241.	14371.	0.11	0.09	0.20
	65	9574.	9825.	10377.	0.03	0.06	0.08
	35/50	0.90	0.91	0.90			
	65/50	0.80	0.74	0.72			
28		1967	1972	1977	67-72	72-77	67-77
	35	8797.	10861.	12062.	0.23	0.11	0.37
	50	10154.	12465.	13506.	0.23	0.08	0.33
	65	8482.	10025.	10382.	0.18	0.04	0.22
	35/50	0.87	0.87	0.89			
	65/50	0.84	0.80	0.77			
29		1967	1972	1977	67-72	72-77	67-77
	35	7285.	7882.	8977.	0.08	0.14	0.23
	50	8244.	9877.	10383.	0.20	0.05	0.26
	65	6386.	8553.	8203.	0.34	-0.04	0.28
	35/50	0.88	0.80	0.86			
	65/50	0.77	0.87	0.79			
30		1967	1972	1977	67-72	72-77	67-77
	35	8447.	9422.	9219.	0.12	-0.02	0.09
	50	9161.	10185.	10047.	0.11	-0.01	0.10
	65	7474.	7309.	7277.	-0.02	-0.00	-0.03
	35/50	0.92	0.93	0.92			
	65/50	0.82	0.72	0.72			

greater than .85 in the nonprofessional occupations (with the exception of farm laborers in 1972, with a ratio of .8). In contrast, this ratio is less than .8 in all years for five of the professional occupations [librarians and social scientists (.77 in 1977), physicians (.68), college faculty (.69), bank officers (.76), and health and education administrators (.77)]. Moreover, in 1977 the ratio was less than .8 for an additional five professional occupations [architects (.79), lawyers (.73), life and physical scientists (.73), other technicians (.79), and writers, artists and entertainers (.79)]. In short, earnings growth over the early stage of the career is, as expected, substantially greater in the professional occupations than in others.

If the growth in earnings over the earlier phase of the career is lesser for nonprofessionals, the decline over the later phase (from age 50 to age 65) is generally much greater. Thus, in 1977 earnings at age 65 are at least 20 percent lower than earnings at age 50 in seven of the eight nonprofessional occupations, while this is true of only eight of the 22 professional occupations. In seven of the professional occupations earnings in 1977 are less than 10 percent lower at age 65 than at age 50 (lawyers, librarians and social scientists, mathematical specialists, nonphysician health professionals, clergy, college faculty, and health and education administrators).

1.4 REAL EARNINGS GROWTH, 1967 TO 1977

The changes in earnings by age and occupation presented in Table III.1.9 clearly indicate that observed declines in the earnings of the highly educated over the course of the 1970s are due not only to a downward shift in the occupational distribution of the educated but also result from relative

declines in earnings within the professional occupations, especially for younger workers.

Consider the following summary of the five- and ten- year changes in real earnings of 35 year olds, by occupation:

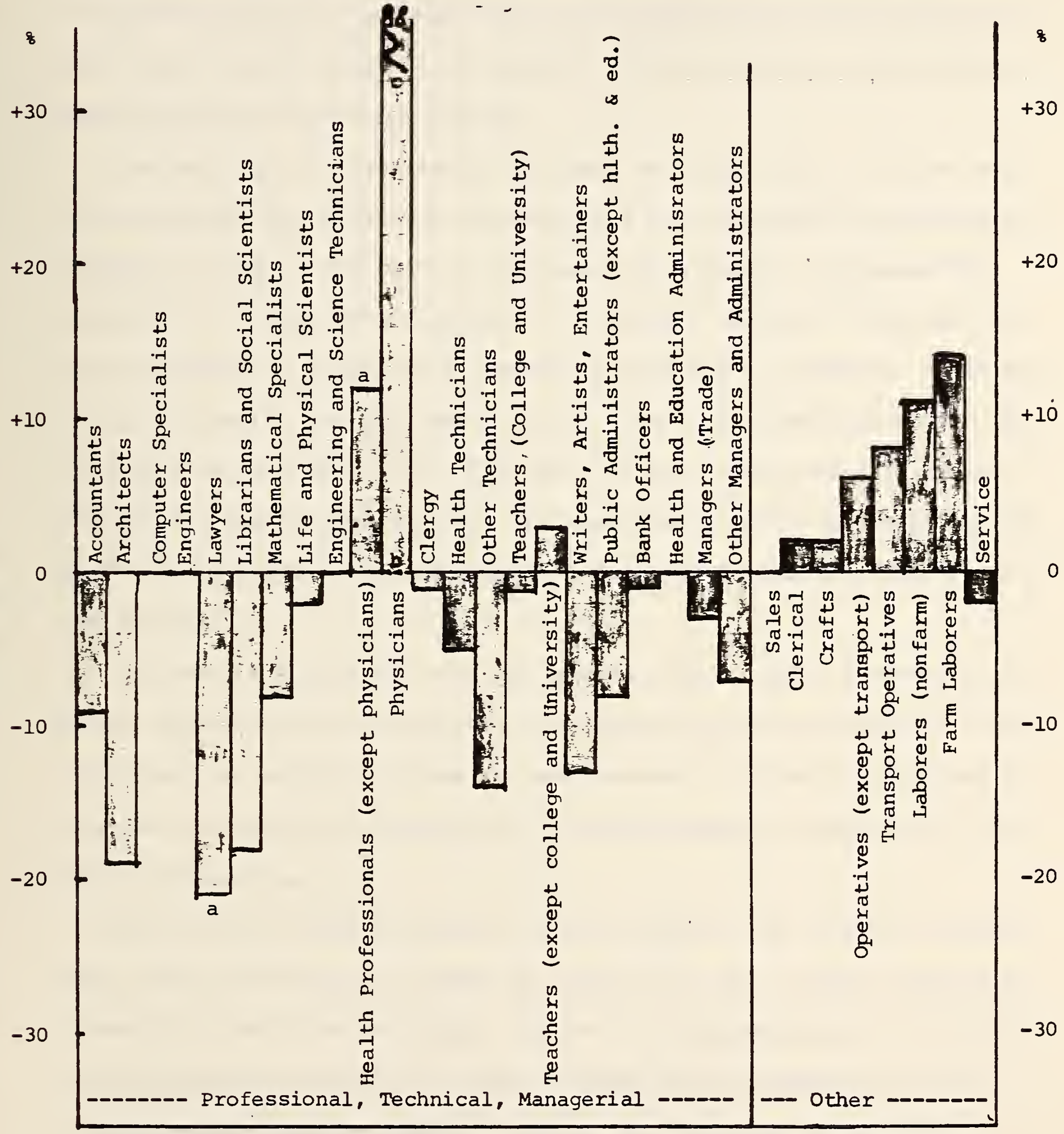
	67-72	72-77	67-77
(1) Accountants	.28	-.09	.16
(2) Architects		-.19	
(3) Computer spec.		.00	
(4) Engineers	.05	.00	.06
(5) Lawyers	.10	-.21	-.13
(6) Librar., soc. sc.	.38	-.18	.13
(7) Math spec.		-.08	
(8) Life & phy. sc.	.05	-.02	.03
(9) Eng. & sc. tech.	.06	.00	.06
(10) Hlth prof.	.07	.12	.20
(11) Physicians	.09	.00	.05
(12) Clergy	.06	-.01	.05
(13) Hlth. tech.	.10	-.05	.04
(14) Oth. tech.	.08	-.14	-.07
(15) College faculty	.03	-.01	.03
(16) Oth. teachers	.11	.03	.14
(17) Writers, et al.	.13	-.13	-.02
(18) Public admin.	.02	-.08	-.06
(19) Bank officers		-.01	
(20) Hlth & ed admin.		.00	
(21) Managers (trade)	.17	-.03	.14
(22) Oth. manag. & ad.	.13	-.07	.05
(23) Sales	.12	.00	.13
(24) Clerical	.13	.02	.16
(25) Crafts	.15	.02	.18
(26) Operatives	.15	.06	.21
(27) Trans. oper.	.11	.08	.20
(28) Laborers (ex farm)	.23	.11	.37
(29) Farm laborers	.08	.14	.23
(30) Service	.12	-.02	.09

As can be readily observed, the changes over the period 1967 to 1972 are all positive, and although generally greater in the nonprofessional occupations, the changes were nontrivial in the professional occupations as well. In contrast, the changes between 1972 and 1977 were positive for all nonprofessional occupations over than services (with a change of -2 percent), but real earnings of 35 year olds declined in 15 of the 22 professional occupations, and in another five professional occupations changes of less than 0.5 percent are observed. While one of these zero changes is fictitious (since the absence of change for physicians is due to the truncation of the earnings variable, as will be discussed), it is nonetheless the case that positive changes in earnings can be verified for only three professional occupations (nonphysician health professionals, physicians and noncollege teachers), and for teachers the observed change is at a rate of less than 0.6 percent per year.

These changes in predicted earnings of 35 year olds between 1972 and 1977 are presented graphically in Figure III.1.1. In this figure mean earnings of 35 year old physicians in 1977 from the HCFA estimates of Chapter II.1 are compared to the CPS estimates from 1972 to provide a more realistic estimate of the growth of physician earnings over this period. In effect, the 1977 CPS and HCFA physician earnings estimates place bounds on the true change over the period. The CPS 1977 estimate is downward biased both because of the universe (including physicians in graduate medical training) and because of the truncation of earnings. However, because the same is true (although, with reference to truncation, to a lesser extent in 1972), a comparison of 1977 HCFA to 1972 CPS physician earnings will result in an upward- biased estimate of the change in earnings over this period. This will be reinforced by the exclusion of physicians not in private practice (apart from hospital- based pathologists, anesthesiologists and radiologists) in the HCFA survey. However, neither bias would be expected to be as severe (in a positive direction) as the (downward) bias in the comparison of 1977 CPS to 1972 CPS physician earnings (due to truncation).

Comparing the HCFA physician estimate for 1977 to the CPS estimate for 1972, an increase in real earnings of young physicians of about 93 percent is derived. While this estimate almost undoubtedly overstates the true growth, due to the incomparabilities of the samples just discussed, the difference is sufficiently great as to indicate that significant real growth of earnings of young physicians did occur over this period. The comparison of the 1977 to 1972 CPS estimates, suggesting zero growth of earnings of 35 year olds, clearly understates the true growth in earnings over this five year period, due to the progressively more severe truncation of earnings, given the ceiling

Figure III.1.1: Percentage Change in Earnings, 1972-77, Age 35



PERCENTAGE CHANGE IN EARNINGS, 1972-77, BY OCCUPATION, 35 YEAR-OLDS

a: Slightly downward- biased, CPS
b: Severely downward- biased, CPS
c: HCFA survey (1977) vs. CPS (1972), slightly upward biased

of $50,000 in current dollars, implying a reduction in the constant (1972 dollar) ceiling from $50,000 in 1972 to $35,537 in 1977, with the proportion of physicians reporting earnings above the ceiling rising from 15.4 percent to 38.8 percent, notwithstanding the probable relative increase in the number of young physicians in graduate training.

The striking fact graphically portrayed by Figure III.1.1 is that with the significant exceptions only of physicians and other health professionals, earnings of young incumbents in professional, technical and managerial occupations declined, often substantially, between 1972 and 1977. The most radical decline, in excess of 20 percent, is observed for lawyers. While the decline in lawyers' earnings may be due in part to truncation, the fact that the predicted earnings in 1977 ($20,639) are well below the CPS ceiling ($35,537 in constant 1972 dollars) indicates that the bias due to truncation must be small and that real earnings of lawyers did decline substantially over this period.

Declines in 35 year old earnings between 1972 and 1977 in excess of ten percent are observed for architects, librarians and social scientists, other technicians and writers, artists and entertainers. And for these groups the bias due to truncation can be only of a trivial magnitude, especially at this relatively young age.

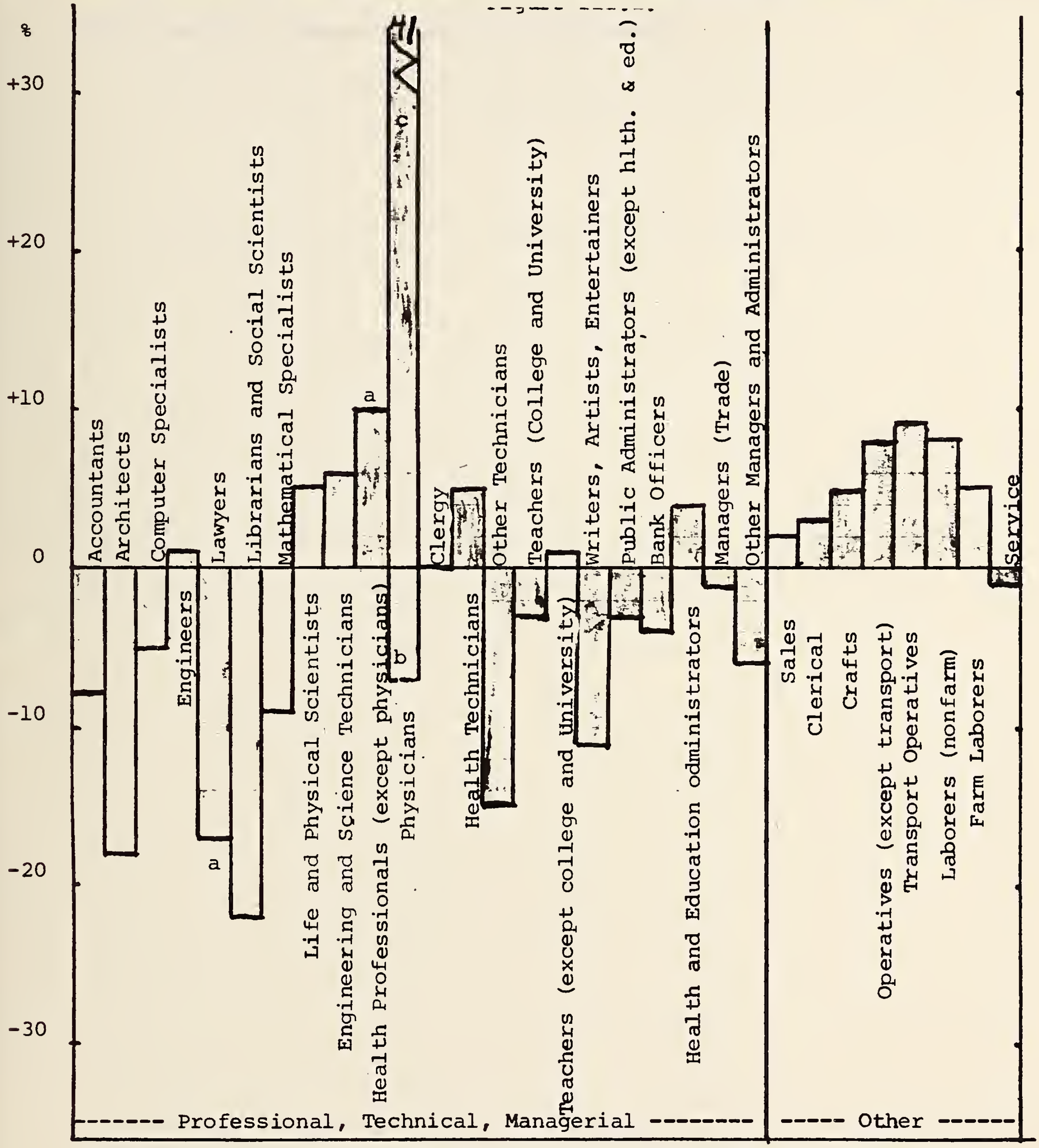
Only farm and nonfarm laborers (for whom there is no effective downward bias) rival the (downward- biased) in- excess- of- ten- percent increase of nonphysician health professionals. Of the other nonprofessional occupations only in sales and services did real earnings remain constant or decline slightly between 1972 and 1977.

Figure III.1.2 provides a comparable display of percentage changes in the real earnings of 50 year old workers between 1972 and 1977. Again the constrast between the professional and nonprofessional occupations is apparent. While earnings in eight of the 20 professional occupations rose over this period, real earnings rose in seven of the eight nonprofessional occupations.

As in the case of 35 year olds, physicians and other health professionals experienced much more substantial earnings growth than did any other professional occupations, although the upper- bound estimate of the growth of real physician earnings at age 50 (comparing the 1977 HCFA estimate to the 1967 CPS estimate) is less than half of that estimated for 35 year olds, 41 versus 98 percent. Indicative of the more severe bias associated with the CPS truncation of earnings at age 50 than at age 35, the CPS- based comparison of 1972 and 1977 would suggest a decline in real earnings of about eight percent, in contrast to the zero change implied at age 35. The lack of credence of this estimate is indicated by the fact than mean predicted earnings of 50 year old physicians in 1977 exceeds the CPS ceiling, $38,531 versus $35,537. Thus, at this prime- earning age the vast majority of physicians are above the ceiling, and as the real dollar ceiling declines, given a constant nominal dollar ceiling and inflation, the downward bias in predicted earnings rises as predicted earnings fall.

Over the decade 1967 to 1977 real earnings generally rose marginally for younger (35 year old) professionals, rose more substantially for older (50 year old) professionals, but rose quite substantially for both younger and older nonprofessionals. Among professionals, only nonphysician health professionals (with earnings growth of at least 20 and 27 percent at ages 35

Figure III.1.2: Percentage Change in Earnings, 1972-77, Age 50



PERCENTAGE CHANGE IN EARNINGS, 1972-77, BY OCCUPATION, 50 YEAR-OLDS

a: Slightly downward- biased, CPS
b: Severely downward- biased, CPS
c: HCFA survey (1977) vs. CPS (1972), slightly upward biased

and 50, respectively) and physicians (with growth of between nine and 116 percent at age 35 and of between minus three and plus 46 percent at age 50) enjoyed marked earnings growth over this decade.

Chapter 2

RETURNS TO OCCUPATIONAL CHOICE AND INVESTMENTS IN PROFESSIONAL TRAINING

2.1 ELEMENTS IN THE DERIVATION OF RETURNS TO OCCUPATIONAL CHOICE

The occupational earnings functions estimated in the preceeding chapter provide the basis for the derivation of estimates of the returns to investments in professional training and occupational choice. In general, this analysis follows the pattern of the analysis of returns to physician specialization presented in Part II, Chapter 2. Thus, the measure of returns is again the increase in the present value of expected lifetime earnings, as supplemented by the annuity equivalent of that increase in the present value.

In contrast to the analysis of returns to physician specialization, for which earnings function estimates were available only for a single time period, it is possible here to examine changes in these cross- sectional present values over time, specifically for the years 1967, 1972 and 1977. Because the CPS- based earnings functions for physicians are severly downward biased in the latter years, the HCFA- based estimates are employed to assess the returns to physician training in the 1977 period. Conjoined with the CPS estimates for 1967 and 1972, it is then possible to derive estimates of changes in the status of physicians over the decade 1967- 1977.

While the basic framework of the analysis of returns to occupational choice is identical to that of the analysis of returns to physician specialization, as summarized in the present value and annuity equivalent

equations (equations II.2.1 and II.2.3), several of the elements entering into these relationships require further development. Specifically, it is necessary to develop estimates of schooling costs and of mortality differentials for each of the CPS occupational groups. Given these, it is possible to directly evaluate the present value and annuity equivalent equations, using the predicted earnings by occupation and age, as presented in Tables III.1.8(1) through III.1.8(3).

2.1.1 Occupational Schooling Requirements and Costs

Unlike physicians, for whom a common level of schooling could be assumed, other occupations generally exhibit less rigid schooling and training requirements. Thus, it is necessary to determine the level of schooling to be assumed in assessing the returns to the choice of one occupation relative to another. Ideally, that level of schooling which maximized the present value of expected lifetime earnings net of schooling costs would be determined for each occupation, and this level of schooling would be assumed in the subsequent analysis. Instead, the present analysis derives estimates of returns to occupational choice of the representative incumbent in any occupation, defining the representative incumbent's schooling as the modal level for the occupation. Thus, the stipulated levels of schooling, by occupation, are:

(1) Accountants	16 years	(16) Oth. teachers	16 years
(2) Architects	16	(17) Writers, et al.	14
(3) Computer spec.	16	(18) Public admin.	14
(4) Engineers	16	(19) Bank officers	16
(5) Lawyers	19	(20) Hlth & ed admin.	18
(6) Librar., soc. sc.	18	(21) Managers (trade)	14
(7) Math spec.	16	(22) Oth. manag. & ad.	14
(8) Life & phy. sc.	18	(23) Sales	14
(9) Eng. & sc. tech.	14	(24) Clerical	12
(10) Hlth prof.	19	(25) Crafts	12
(11) Physicians	20	(26) Operatives	12
(12) Clergy	18	(27) Trans. oper.	12
(13) Hlth. tech.	14	(28) Laborers (ex farm)	12
(14) Oth. tech.	16	(29) Farm laborers	12
(15) College faculty	20	(30) Service	12

A subsequent chapter then examines the issue of the optimality of observed levels of schooling by occupation.

While the foregone earnings associated with schooling represent the greater proportion of the costs of that schooling, it is also necessary to take into account out- of- pocket costs. As discussed with reference to the treatment of schooling costs in the derivation of the present value of expected lifetime physician earnings net of schooling costs, because foregone earnings are taken into account, it is appropriate to deduct only those costs incurred entirely as a result of the choice of schooling, exclusive of the costs of personal subsistence. Thus, schooling costs relevant here include tuition, fees and other directly instruction- related expenses (books and supplies, etc.), but exclude such costs as room and board.

For present purposes, estimates by the National Center for Education Statistics of costs of tuition and fees in two- and four- year public colleges and universities in the three years (1967, 1972 and 1977) are employed. These costs at four- year institutions are further differentiated by undergraduate and graduate- professional status. In those occupations in which the modal level of schooling is 12 years, no schooling costs are incorporated, i.e., a

high school graduate provides the base for comparison. This is consistent with the evaluation of the present value of expected lifetime earnings at age 18.

In occupations in which the modal level of schooling is 14 years, it is assumed that education beyond high school is obtained in a public two- year institution. When modal schooling is 16 years or greater, all schooling beyond high school is assumed to be obtained in a four- year public college or university. Assumed costs per year of schooling, expressed in constant 1972 dollars (deflating by the implicit Personal Consumption Expenditure deflator), are:

	1967	1972	1977
Two- year public college	$177	$233	$214
Four- year public college undergraduate	330	455	414
Four- year public college graduate	450	566	520

It will be noted that, while the indicated 1977 undergraduate cost was assumed for physicians, the assumed graduate cost was substantially greater, $3,667. Effectively, in the assessment of returns to physician training and specialization, it is assumed, conservatively, that the 1977 physician obtained his medical education in a private medical school. This will bias downward estimates of returns to physician training relative to alternative occupational choices and estimates of changes over time in physician lifetime earnings.

2.1.2 Occupational Mortality Adjustments

Age- specific mortality rates of white males in 1975 provide the basis for the derivation of expected earnings by age. These rates are specified by year of age for each age from 18 to 69. The basic pattern of age- specific mortality is indicated by the following values at five- year intervals:

Age	Deaths/1000	Age	Deaths/1000
19	1.85	44	4.44
24	1.79	49	7.46
29	1.60	54	11.53
34	1.86	59	19.07
39	2.68	64	28.75
		69	43.27

Because these rates refer to the population as a whole, it is necessary to introduce an adjustment for occupational differences in mortality experience. Unfortunately, the most recent available data relate to interoccupational mortality differences in 1950. Thus, it is necessary to assume that these differentials have not altered subsequently.[1] The adjustment utilizes the standard mortality ratio (ratio of actual to expected deaths) estimated for persons between the ages of 20 and 64, by occupation:

(1) Accountants	.94	(16) Oth. teachers	.61
(2) Architects	.92	(17) Writers, et al.	1.23
(3) Computer spec.	.56	(18) Public admin.	.68
(4) Engineers	.73	(19) Bank officers	.81
(5) Lawyers	.90	(20) Hlth & ed admin.	.68
(6) Librar., soc. sc.	.45	(21) Managers (trade)	.98
(7) Math spec.	.56	(22) Oth. manag. & ad.	.86
(8) Life & phy. sc.	.56	(23) Sales	.96
(9) Eng. & sc. tech.	.73	(24) Clerical	.84
(10) Hlth prof.	.99	(25) Crafts	.98
(11) Physicians	.91	(26) Operatives	.95
(12) Clergy	.83	(27) Trans. oper.	.96
(13) Hlth. tech.	1.09	(28) Nonfarm laborers	1.27
(14) Oth. tech.	.99	(29) Farm laborers	.83
(15) College faculty	.52	(30) Service	1.09

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[1] In fact, a significant part of the overall decline in mortality rates since 1950 may well be due to the change in the occupational composition of employment which has occured over this period. If this is the case, then there will be a downard bias in the occupation- adjusted age- specific mortality rates utilized here. However, this bias should not be great, since the effects of mortality on expected future earnings are substantial only at advanced ages, when the effect of mortality is overwhelmed by the effect of discounting to age 18.

Because mortality rates are significantly higher than average for nonworkers, the standard mortality ratios are less than unity for most occupations. While the lowest relative mortality rates are observed in several of the professions [e.g., librarians and social scientists (.45); college faculty (.52); computer and mathematical specialists, life and physical scientists (.56)], those for many of the professions approximate the mortality rates in nonprofessional occupations. This is the case, notably, for physicians and other health professionals. And two professions, health technicians and writers, artists and entertainers, exhibit rates above unity and higher than those of any occupation other than nonfarm laborers.

Together, the age- specific mortality rates and the occupation- specific standard mortality ratios permit the derivation (equation II.2.5) of the age-occupation- specific probabilities of survival from age 18 to any subsequent age, survival rates which then enter into the computation of the present values of expected future earnings (equation II.2.1) and of the annuity equivalents of these present values (equation II.2.3).

2.2 RETURNS TO PROFESSIONAL TRAINING AND OCCUPATIONAL CHOICE

Tables III.2.1(1) through III.2.1(3) present estimates of the present values of expected lifetime earnings and of annuity equivalents for 1967, 1972 and 1977, respectively. As in the case of the physician specialties, both hours-adjusted and hours- unadjusted estimates are presented. The unadjusted estimates utilize predicted earnings at the level of working hours predicted for the occupation. Two alternative hours- adjusted estimates of the present values for 1967 and 1972 are presented. The first utilizes the geometric mean of predicted hours at each age for the 22 professional, technical and

managerial occupations in 1977. The second utilizes the corresponding geometric mean for the year in question (1967, 1972). These are denoted PV_{A77} and PV_A, respectively.

For each of the hours- adjusted estimates of the present values, corresponding annuity equivalents (payments in each year between the ages of 19 and 70) are determined, denoted AN_{A77} and AN_A. For the former the difference between the present value for the occupation and mean present value over the 22 professional, technical and managerial occupations underlies the annuity computation. The latter utilizes the mean present value for the year in question. The difference between the hours- unadjusted present value for the occupation and the mean present value in 1977 results in an annuity equivalent denoted AN_{U77}, while the difference between the present value for the occupation and the mean for the year in question results in AN_U.

Corresponding 1977 present values of expected lifetime earnings and annuity equivalents for physician specialies (and the mean over all specialties) are presented in Table III.2.2. In contrast to the hours- adjusted present values of Table II.2.1, these present values utilize earnings at mean hours over the 22 professional, technical and managerial occupations from the CPS in 1977. Similarly, the annuity equivalents, hours- adjusted and unadjusted, utilize the mean present values from the 1977 CPS estimates. Thus, Table III.2.2 provides the basis for assessing the relative profitability of physician training in 1977 and the change in physician earnings over the decade 1967 to 1977.

It should be noted that the mean 1977 present value for the professional, technical and managerial occupations is slightly downward biased because of the downward biases in the CPS estimates for lawyers, nonphysician health

Table III.2.1(1)

1967 PRESENT VALUES, ANNUITY EQUIVALENTS

	PV_A	AN_A	PV_{A77}	AN_{A77}	PV_U	AN_U	AN_{U77}
(1) ACCOUNTANTS	184.5	-1264.	183.8	-1930.	183.1	-1346.	-1931.
(2) ARCHITECTS							
(3) COMPUTER SPECIALISTS							
(4) ENGINEERS	219.6	721.	218.6	45.	216.4	536.	-44.
(5) LAWYERS	280.1	4151.	276.9	3348.	252.3	4836.	4251.
(6) LIBRARIANS, SOC. SC.	214.4	419.	210.9	-382.	183.2	-1313.	-1886.
(7) MATHEMATICAL SPEC.							
(8) LIFE & PHY. SCIENTISTS	200.0	-382.	198.8	-1059.	193.8	-730.	-1305.
(9) ENG. & SC. TECHNICIANS	178.8	-1576.	177.5	-2263.	176.1	-1731.	-2311.
(10) HLTH. PROF. (NONPHYS.)	249.6	2434.	248.0	1716.	257.1	2856.	2269.
(11) PHYSICIANS	280.6	4177.	279.0	3468.	301.5	5362.	4777.
(12) CLERGY	108.3	-5562.	108.1	-6192.	101.4	-5954.	-6536.
(13) HEALTH TECHNICIANS	166.0	-2330.	165.5	-2988.	159.2	-2721.	-3310.
(14) OTHER TECHNICIANS	180.3	-1506.	179.6	-2159.	178.5	-1616.	-2203.
(15) COLLEGE FACULTY	167.7	-2177.	166.5	-2853.	170.8	-2010.	-2584.
(16) OTHER TEACHERS	145.3	-3440.	145.0	-4070.	145.4	-3434.	-4011.
(17) WRITERS ET AL.	193.4	-772.	192.2	-1469.	188.3	-1069.	-1662.
(18) PUBLIC ADMINISTRATORS	184.9	-1226.	182.8	-1960.	182.2	-1384.	-1963.
(19) BANK OFFICERS							
(20) HEALTH, ED. ADMIN.							
(21) MANAGERS (TRADE)	194.4	-703.	192.6	-1432.	194.6	-697.	-1283.
(22) OTH. MANAG., ADMINIS.	221.7	839.	220.2	137.	223.0	911.	327.
(23) SALES	179.1	-1574.	177.2	-2304.	178.2	-1629.	-2215.
(24) CLERICAL	158.0	-2754.	156.5	-3462.	154.1	-2978.	-3560.
(25) CRAFTS	178.8	-1591.	177.6	-2284.	176.5	-1727.	-2313.
(26) OPERATIVES (NONTRANS.)	160.9	-2604.	159.4	-3312.	156.7	-2847.	-3433.
(27) TRANSPORT OPERATIVES	164.3	-2416.	162.4	-3143.	166.0	-2319.	-2905.
(28) LABORERS (NONFARM)	137.9	-3962.	136.8	-4660.	134.5	-4167.	-4761.
(29) FARM LABORERS	107.7	-5592.	106.9	-6257.	112.2	-5344.	-5926.
(30) SERVICE	132.1	-4263.	130.4	-4989.	130.1	-4383.	-4972.
MEAN	206.8		217.8		206.9		

Table III.2.1(2)

1972 PRESENT VALUES, ANNUITY EQUIVALENTS

		PV_A	AN_A	PV_{A77}	AN_{A77}	PV_U	AN_U	AN_{U77}
(1)	ACCOUNTANTS	235.8	379.	233.7	905.	233.8	274.	942.
(2)	ARCHITECTS	273.5	2513.	275.3	3257.	273.5	2522.	3190.
(3)	COMPUTER SPECIALISTS	218.5	-591.	217.5	-16.	214.7	-797.	-140.
(4)	ENGINEERS	230.2	60.	229.8	675.	228.1	-47.	615.
(5)	LAWYERS	296.8	3830.	293.3	4272.	311.7	4685.	5352.
(6)	LIBRARIANS, SOC. SC.	259.6	1690.	256.3	2138.	261.1	1784.	2438.
(7)	MATHEMATICAL SPEC.	240.5	634.	239.6	1218.	238.7	539.	1196.
(8)	LIFE & PHY. SCIENTISTS	218.8	-579.	217.6	-14.	210.4	-1037.	-380.
(9)	ENG. & SC. TECHNICIANS	188.7	-2272.	187.5	-1704.	183.6	-2550.	-1888.
(10)	HLTH. PROF. (NONPHYS.)	278.1	2781.	277.4	3387.	277.3	2748.	3418.
(11)	PHYSICIANS	328.3	5616.	328.1	6247.	325.3	5455.	6123.
(12)	CLERGY	103.8	-7071.	103.3	-6462.	105.1	-6993.	-6328.
(13)	HEALTH TECHNICIANS	171.0	-3321.	170.3	-2713.	167.5	-3509.	-2836.
(14)	OTHER TECHNICIANS	193.5	-2028.	192.8	-1424.	189.4	-2252.	-1582.
(15)	COLLEGE FACULTY	181.4	-2655.	180.5	-2074.	177.2	-2880.	-2224.
(16)	OTHER TEACHERS	162.8	-3710.	162.5	-3092.	162.4	-3719.	-3060.
(17)	WRITERS ET AL.	221.3	-449.	220.3	142.	215.5	-775.	-98.
(18)	PUBLIC ADMINISTRATORS	190.2	-2184.	188.6	-1639.	182.6	-2603.	-1942.
(19)	BANK OFFICERS	251.5	1260.	249.3	1778.	248.1	1075.	1740.
(20)	HEALTH, ED. ADMIN.	224.0	-286.	222.9	288.	223.8	-292.	369.
(21)	MANAGERS (TRADE)	215.4	-780.	213.8	-225.	218.6	-591.	78.
(22)	OTH. MANAG., ADMINIS.	250.3	1198.	249.0	1763.	252.5	1328.	1994.
(23)	SALES	201.6	-1564.	199.6	-1035.	199.4	-1678.	-1009.
(24)	CLERICAL	177.9	-2892.	176.0	-2361.	173.7	-3122.	-2457.
(25)	CRAFTS	200.1	-1652.	198.7	-1086.	197.0	-1819.	-1150.
(26)	OPERATIVES (NONTRANS.)	176.4	-2994.	174.7	-2443.	173.5	-3150.	-2481.
(27)	TRANSPORT OPERATIVES	186.8	-2404.	185.1	-1854.	184.6	-2518.	-1849.
(28)	LABORERS (NONFARM)	168.8	-3470.	167.2	-2909.	164.2	-3727.	-3049.
(29)	FARM LABORERS	120.1	-6153.	119.2	-5566.	125.2	-5860.	-5195.
(30)	SERVICE	142.0	-4973.	140.3	-4427.	140.3	-5062.	-4389.
	MEAN	229.1		217.8		229.0		

Table III.2.1(3)

1977 PRESENT VALUES, ANNUITY EQUIVALENTS

	PV_A	AN_A	PV_U	AN_U
(1) ACCOUNTANTS	219.2	79.	212.8	-247.
(2) ARCHITECTS	226.2	476.	218.1	52.
(3) COMPUTER SPECIALISTS	211.0	-383.	207.4	-543.
(4) ENGINEERS	235.1	971.	229.7	706.
(5) LAWYERS	254.0	2046.	257.1	2261.
(6) LIBRARIANS, SOC. SC.	232.2	798.	208.2	-495.
(7) MATHEMATICAL SPEC.	227.9	561.	222.6	304.
(8) LIFE & PHY. SCIENTISTS	206.2	-649.	205.0	-681.
(9) ENG. & SC. TECHNICIANS	192.3	-1433.	181.1	-2028.
(10) HLTH. PROF. (NONPHYS.)	317.9	5688.	316.5	5648.
(11) PHYSICIANS	307.9	5102.	312.4	5393.
(12) CLERGY	102.5	-6511.	110.4	-6027.
(13) HEALTH TECHNICIANS	164.1	-3071.	172.2	-2570.
(14) OTHER TECHNICIANS	167.1	-2884.	163.5	-3052.
(15) COLLEGE FACULTY	170.3	-2646.	176.8	-2245.
(16) OTHER TEACHERS	165.4	-2930.	163.6	-2992.
(17) WRITERS ET AL.	196.3	-1235.	188.1	-1671.
(18) PUBLIC ADMINISTRATORS	182.9	-1957.	167.6	-2779.
(19) BANK OFFICERS	243.0	1421.	241.5	1373.
(20) HEALTH, ED. ADMIN.	224.0	347.	224.7	424.
(21) MANAGERS (TRADE)	207.7	-575.	210.9	-354.
(22) OTH. MANAG., ADMINIS.	231.2	757.	234.9	999.
(23) SALES	202.7	-862.	201.5	-890.
(24) CLERICAL	182.5	-1998.	173.3	-2475.
(25) CRAFTS	208.7	-519.	201.4	-898.
(26) OPERATIVES (NONTRANS.)	191.0	-1521.	183.1	-1932.
(27) TRANSPORT OPERATIVES	195.8	-1252.	198.7	-1048.
(28) LABORERS (NONFARM)	186.4	-1810.	180.4	-2116.
(29) FARM LABORERS	127.5	-5099.	139.9	-4364.
(30) SERVICE	140.3	-4425.	137.4	-4556.
MEAN	217.8		217.2	

professionals and, especially, physicians. However, because persons in these occupations represent only a small fraction of all professional, technical and managerial employment, the degree of downward bias in the mean present value (implying an upward bias in the annuity equivalents) will be slight.

The most striking fact revealed by Tables III.2.1(1- 3) is the convergence in lifetime earnings by occupation which occured over the decade. On an hours- adjusted basis (using mean hours in each year), the annuity equivalents of lifetime earnings differentials were close to zero (± $1,000) for only six occupations in 1967 (engineers, librarians and social scientists, life and physicial scientists, writers et al., trade managers, and other managers and administrators), a number which increased to eight in 1972 (accountants, computer specialists, engineers, mathematical specialists, life and physicial scientists, writers et al., health and education administrators, and trade managers) and further to ten in 1977 (accountants, architects, computer specialists, engineers, librarians and social scientists, mathematical specialists, life and physicial scientists, health and education administrators, trade managers, and other managers and administrators).

While the physician annuity equivalent increased from $4,200 in 1967 to $5,600 in 1972 and further to $14,800 (HCFA- based estimate) in 1977, and that of other health professionals increased from $2,400 in 1967 to $2,800 in 1972 and $5,700 in 1977, the annuity equivalent of the differential in lifetime earnings of lawyers declined from $4,200 in 1967 to $3,800 in 1972 and futher to $2,000 in 1977. With reference to all other occupations for which the annuity equivalent was significantly positive in 1972 [architects ($2,500), librarians and social scientists ($1,700), bank officiers ($1,300), and other managers and administrators ($1,200)], by 1977 this value had declined to

TABLE III.2.2

Physician Specialty Present Values and Annuity Equivalents Relative to Non-PTM Mean, 1977

ALLERGY	1	488.0	15162.	490.4	15331.
CARDIOLOGY	2	587.9	20769.	595.1	21208.
DERMATOLOGY	3	486.6	15092.	481.7	14850.
GASTROENTEROLOGY	4	434.8	12180.	472.2	14308.
GENERAL PRACTICE	5	427.5	11883.	476.9	14712.
GENERAL SURGERY	6	533.2	17707.	539.8	18111.
INTERNAL MEDICINE	7	463.9	13790.	491.4	15362.
NEURO. SURGERY	8	599.2	21399.	622.0	22711.
OB/GYN	9	504.5	16078.	533.3	17727.
OPTHALMOLOGY	10	571.6	19802.	580.4	20325.
ORTHOPEDIC SURG.	11	577.0	20111.	604.8	21699.
OTOLARYNGOLOGY	12	526.7	17285.	548.7	18551.
PEDIATRICS	13	398.6	10093.	413.6	10959.
PSYCHIATRY	14	422.3	11510.	446.7	12917.
UROLOGY	15	485.8	15033.	478.6	14667.
ANESTHESIOLOGY	16	448.7	12957.	447.1	12905.
PATHOLOGY	17	504.3	16041.	504.4	16080.
RADIOLOGY	18	498.1	15755.	500.9	15947.
MEAN	19	480.5	14752.	499.9	15874.

insignificance for all occupations other than bank officers (with a 1977 value of $1,400).

At the low end of the continuum, the number of occupations for which the annuity equivalents indicate a substantial loss (less than - $2,000), after rising from four in 1967 [clergy (-$5,600), health technicians (-$2,300), college faculty (-$2,200), and other teachers (-$3,400)] to seven in 1972 [engineering and science technicians (-$2,300), clergy (-$7,100), health technicians (-$3,300), other technicians (-$2,000), college faculty (-$2,700), other teachers (-$3,700), and public administrators (-$2,200)], fell to five in 1977 [clergy (-$6,500), health technicians (-$3,100), other technicians (-$2,900), college faculty (-$2,600), and other teachers (-$2,900)].

This compression in the distribution of the present values of expected lifetime earnings is clearly revealed by the following grouping of occupations in the three years into earnings- differential classes, on the basis of the year- specific hours- adjusted annuity equivalents:

	1967	1972	1977
Extremely High (>$3,000)	Physicians Lawyers	Physicians Lawyers	Physicians Oth. hlth. prof.
Very High ($2,000/$3,000)	Oth. hlth. prof.	Oth. hlth. prof. Architects	Lawyers
High ($1,000/$2,000)		Librar., soc. sc. Bank officers Oth. man., admin.	Bank officers
Mean (-$1,000/$1,000)	Oth. man., admin. Engineers Librar., soc. sc. Life, phy. sc. Trade managers Writers et al.	Math. spec. Accountants Engineers Hlth., ed. admin. Writers et al. Life, phy. sc. Computer spec. Trade managers	Engineers Librar., soc. sc. Oth. man., admin. Math. spec. Architects Hlth., ed. admin. Accountants Computer spec. Trade managers Life, phy. sc.
Low (-$2,000/-$1,000)	Accountants Public admin. Oth. tech. Eng., sc. tech.		Writers et al. Eng., sc. tech. Public admin.
Very Low (-$3,000/-$2,000)	College faculty Hlth. tech.	Oth. tech. Public admin. Eng., sc. tech. College faculty	College faculty Oth. tech. Teachers
Extremely Low (< -$3,000)	Teachers Clergy	Hlth. tech. Teachers Clergy	Hlth tech. Clergy

In general, increasing dispersion between 1967 and 1972 was followed by significant compression between 1972 and 1977. At the same time, however, the difference between the occupations in the upper tail of the distribution (physicians and other health professionals) and other occupations widened considerably.

Trend changes in the present values of expected lifetime earnings also altered dramatically between the first and second five- year periods. Between

1967 and 1972 the estimated present value (at mean 1977 hours of work) declined in only one occupation, clergy (from $108 thousand to $103 thousand). Over this period, increases in excess of ten percent were observed in nine of the professional, technical and managerial occupations (accountants, librarians and social scientists, life and physical scientists, nonphysician health professionals, physicians, noncollege teachers, writers et al., trade managers, and other managers and administrators).

In contrast, between 1972 and 1977 the 1977- hours- adjusted present values of expected lifetime earnings declined in 16 of the 22 professional and related occupations, and in four of these the declines exceeded tend percent (architects, lawyers, other technicians, and writers et al.). In the remaining six occupations the present value increased significantly only for nonphysician health professionals (from $277 thousand to $318 thousand) and physicians (from $328 thousand to $480 thousand). It should be recalled, of course, that the estimate for physcians is somewhat upward biased, because the CPS estimate of the present value in 1972 is biased downward due to truncation of reported earnings. However, it is clear that physicians stand out as one of only two occupations in which real earnings increased significantly over the course of the 1970s.

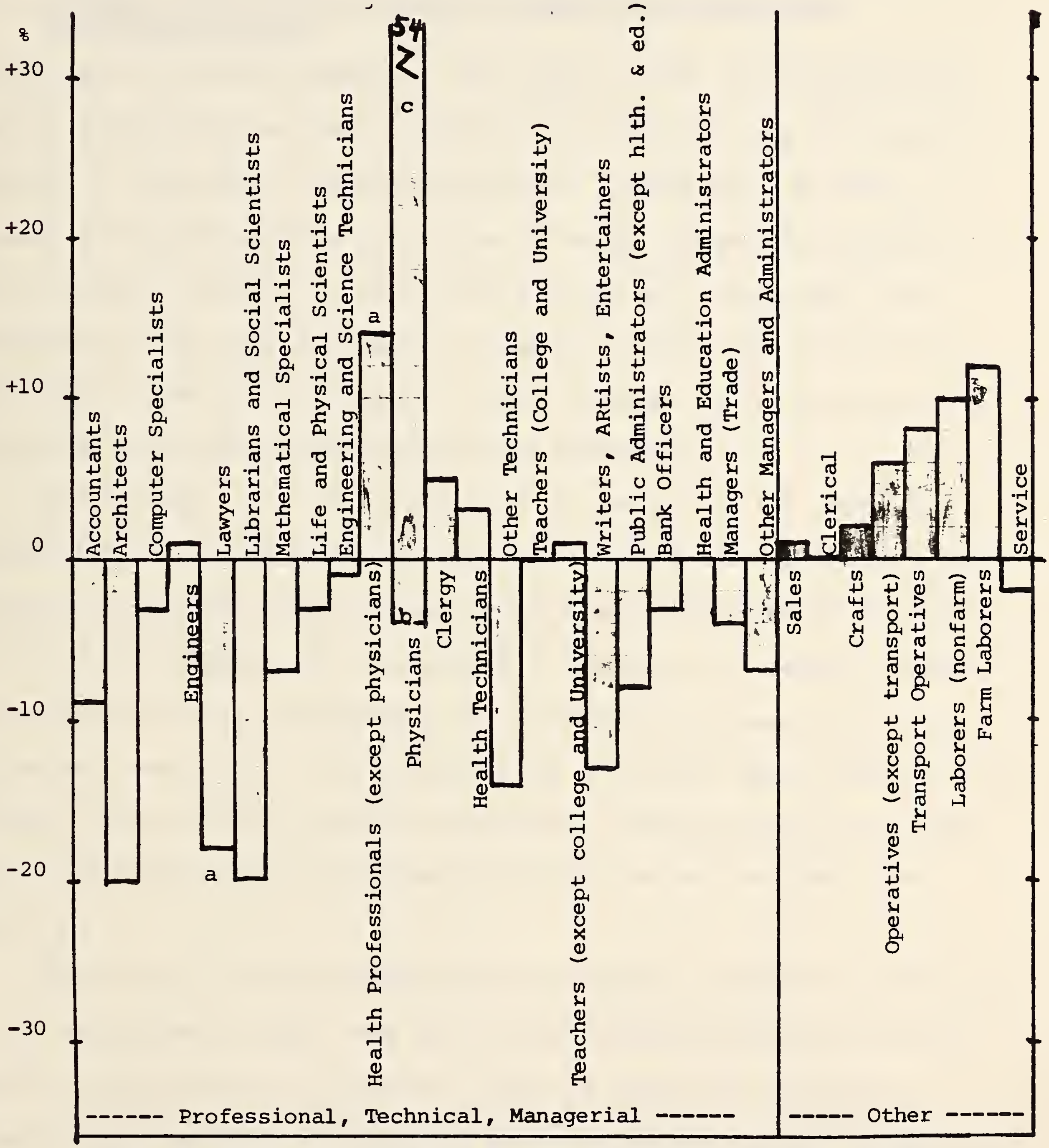
The general pattern of change in hours- adjusted earnings is also observed for unadjusted earnings, as indicated by Figure III.2.1, which presents the percentage change in the unadjusted present values of expected lifetime earnings between 1972 and 1977. While minor increases in unadjusted earnings are observed for clergy, health technicians and noncollege teachers, significant increases appear only for nonphysician health professionals and physicians. In contrast, substantial declines (in excess of ten percent) are

observed for architects, lawyers, librarians and social scientists, other technicians, and writers et al.

As in the case of predicted earnings by age (discussed in the previous chapter), developments in the professional occupations are not observed in the nonprofessional occupations. Differentials between the nonprofessional and professional occupations narrowed over both five year periods, but at an especially rapid rate between 1972 and 1977. Thus, by 1977 the present values of expected lifetime earnings in the nonprofessional occupations were generally higher than in many of the professions. Only farm laborers (for whom income in kind may well be an important but unobserved component of total earnings) and service workers had earnings corresponding to annuity equivalents (relative to the professional mean) of less than -$2,000 per year, while the sales and crafts occupations enjoyed incomes equivalent to the mean for the professional occupations.

While returns to nonmedical physician specialization were previously found to be substantial (Part II, Chapter 2), Table III.2.2 clearly indicates that physcians of all specialties enjoyed lifetime earnings substantially above those of other occupations. Even in the lowest earning specialties the differentials in earnings imply annuity equivalents in excess of $10,000, and in cardiology, neurological surgery and orthopedic surgery the differentials (on an hours- adjusted basis) exceed $20,000. While a failure to adjust for hours differences would lead to an overestimate of returns to physician training and specialization, the degree of error would be slight. Similarly, the bias introduced by the comparison of the 1977 HCFA to the 1972 CPS estimates, while greater, would be relatively minor by comparison to the overall magnitude of the earnings differential estimated to separate

Figure III.2.1: Percentage Change in Lifetime Earnings, 1972-1977, By Occupation



PERCENTAGE CHANGE IN LIFETIME EARNINGS, 1972-77, BY OCCUPATION

a: Slightly downward- biased, CPS
b: Severely downward- biased, CPS
c: HCFA survey (1977) vs. CPS (1972), slightly upward biased

physicians and other professionals. The possible explanations for this differential and its impliations provide the focus for Part IV of this study.

2.3 INTERNAL INCOME RATES OF RETURN TO PROFESSIONAL TRAINING AND OCCUPATIONAL CHOICE

As discussed in detail previously, net capital values (and corresponding annutiy equivalents) are more appropriate than internal rates of return as measures of returns to discrete occupational investments. In effect, a ranking of occupations by internal rates of return ignores the magnitude of the investment involved. A high rate of return on a necessarily small investment may be worth substantially less than a lower rate of return on a much larger investment, as long as the rate of return to the latter is above the return to alternative, comparably large investments.

Notwithstanding its inadequacies as a measure of the relative desirability of an occupation, the internal rate of return is more commonly employed as a measure of occupational returns and is more readily understood (if not fully comprehended) by nontechnical audiences. Therefore, internal income rates of return corresponding to the foregoing estimates of net capital values have been derived. In contrast to the net capital values, however, the internal rates of return estimates utilize mean earnings by age in the eight non- professional/technical/managerial occupations as the basis for comparison.

Derived rate- of- return estimates are presented in Table III.2.3 for the 30 CPS occupations in 1967, 1972 and 1977 and in Table III.2.4 for the 1977 physician specialties. In each case rates of return are calculated at geometric mean hours and at occupation/specialty- specific hours. In the case of the physician specialties, rates of return are derived by comparison to

general practice and to the non- professional/technical/managerial CPS occupations.

The inadquacies of the internal income rate of return are clearly indicated by the relatively large number of estimates greater or less than 0.501 (the greatest absolute value permitted). In all cases these extreme estimates represent instances in which the earnings (net of schooling cost) profile for the occupation fails to intersect the mean profile of the non-professional/technical/managerial occupations. When intersection fails to occur, the internal income rate of return is infinitely positive or negative, i.e., there is no rate at which the discounted present values of the two profiles would be equal.

While less informative concerning the relative gains and losses associated with alternative occupations, the estimated internal rates of return are not inconsistent with the estimated net capital values, especially in the more extreme cases. Thus, these more commonly utilized measures confirm the results of the preceeding analysis.

TABLE III.2.3

Internal Rates of Return by Occupation, 1967, 1972 and 1977

	Geometric Mean Hours			Actual Occupational Hours		
	1967	1972	1977	1967	1972	1977
Accountants	0.087	0.122	0.092	0.091	0.125	0.091
Architects	<-0.501	0.154	0.099	<-0.501	0.164	0.095
Computer spec.	<-0.501	0.103	0.087	<-0.501	0.100	0.084
Engineers	0.137	0.117	0.115	0.139	0.122	0.117
Lawyers	0.140	0.128	0.096	0.154	0.140	0.103
Librar., soc. sc.	0.106	0.113	0.089	0.072	0.115	0.071
Math. Spec.	<-0.501	0.125	0.109	<-0.501	0.130	0.105
Life, phys. sc.	0.092	0.083	0.065	0.087	0.079	0.068
Eng., sc. tech.	0.100	0.065	0.057	0.101	0.058	0.033
Hlth. prof.	0.123	0.123	0.143	0.134	0.125	0.146
Physicians (CPS)	0.117	0.124	0.121	0.127	0.127	0.121
Physicians (HCFA)			0.157			0.165
Clergy	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501
Health tech.	0.056	<-0.501	<-0.501	0.042	<-0.501	<-0.501
Oth. tech.	0.078	0.066	0.003	0.077	0.063	0.010
College fac.	0.053	0.049	0.035	0.058	0.048	0.044
Oth. teachers	0.006	0.008	-0.023	0.013	0.013	-0.014
Writers, et al.	0.141	0.143	0.067	0.133	0.139	0.057
Public admin.	0.120	0.072	0.028	0.121	0.057	-0.002
Bank officers	<-0.501	0.126	0.112	<-0.501	0.128	0.119
Hlth./ed. admin.	<-0.501	0.090	0.082	<-0.501	0.093	0.087
Trade managers	0.148	0.137	0.095	0.168	0.162	0.121
Oth. man./admin.	0.205	0.223	0.153	0.226	0.249	0.187
Sales	0.103	0.107	0.089	0.106	0.108	0.100
Clerical	<-0.501	-0.170	<-0.501	<-0.501	<-0.501	<-0.501
Crafts	>0.501	>0.501	>0.501	>0.501	>0.501	>0.501
Operatives	-0.124	<-0.501	-0.007	-0.271	<-0.501	-0.054
Trans. op.	0.058	>0.501	>0.501	>0.501	>0.501	>0.501
Nonfarm laborers	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501
Farm laborers	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501
Service	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501	<-0.501

TABLE III.2.4

Internal Income Rates of Return to Physician Specialization, 1977

	Relative to Non-PTM		Rel. to Gen. Practice	
	Geometric Mean Hours	Specialty Mean Hours	Geometric Mean Hours	Specialty Mean Hours
Allergy	0.156	0.160	0.143	0.069
Cardiology	0.170	0.175	0.250	0.174
Dermatology	0.159	0.162	0.173	0.067
Gastroenterology	0.146	0.159	0.066	0.045
Gen./Fam. Prac.	0.158	0.175	0.001	0.001
General Surgery	0.164	0.168	0.202	0.126
Internal Medicine	0.159	0.169	0.182	0.090
Neur. Surgery	0.168	0.175	0.221	0.172
Obstet./Gyn.	0.160	0.169	0.177	0.133
Opthalmology	0.175	0.180	0.300	0.214
Orthoped. Surg.	0.168	0.176	0.220	0.178
Otolaryngology	0.162	0.169	0.187	0.139
Pediatrics	0.141	0.149	-0.028	-0.108
Psychiatry	0.143	0.152	0.036	-0.017
Urology	0.155	0.156	0.138	0.057
Anesthesiology	0.151	0.154	0.100	-0.011
Pathology	0.160	0.163	0.174	0.089
Radiology	0.160	0.154	0.175	0.093
MEAN	0.157	0.165	0.154	0.088

PART IV

IMPLICATIONS OF THE EARNINGS- FUNCTION ANALYSIS

People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices. It is impossible indeed to prevent such meetings, by any law which either could be executed, or would be consistent with liberty and justice. But though the law cannot hinder people of the same trade from sometimes assembling together, it ought to do nothing to facilitate such assemblies; much less to render them necessary.

A regulation which obliges all those of the same trade in a particular town to enter their names and places of abode in a public register, facilitates such assemblies. It connects individuals who might never otherwise be known to one another, and gives every man of the trade a direction where to find every other man of it.

A regulation which enables those of the same trade to tax themselves in order to provide for their poor, their sick, their widows and orphans, by giving them a common interest to manage, renders such assemblies necessary.

An incorporation not only renders them necessary, but makes the act of the majority binding upon the whole. In a free trade an effectual combination cannot be established but by the unanimous consent of every single trader,[51] and it cannot last longer than every single trader continues of the same mind. The majority of a corporation can enact a bye-law with proper penalties, which will limit the competition more effectually and more durably than any voluntary combination whatever.

The pretence that corporations are necessary for the better government of the trade, is without any foundation. The real and effectual discipline which is exercised over a workman, is not that of his corporation, but that of his customers. It is the fear of losing their employment which restrains his frauds and corrects his negligence. An exclusive corporation necessarily weakens the force of this discipline. A particular set of workmen must then be employed, let them behave well or ill. It is upon this account, that in many large incorporated towns no tolerable workmen are to be found, even in some of the most necessary trades. If you would have your work tolerably executed, it must be done in the suburbs, where the workmen, having no exclusive privilege, have nothing but their character to depend upon, and you must then smuggle it into the town as well as you can.

It is in this manner that the policy of Europe, by restraining the competition in some employments to a smaller number than would otherwise be disposed to enter into them, occasions a very important inequality in the whole of the advantages and disadvantages of the different employments of labour and stock.

Adam Smith (1776, pp. 128-9)

Chapter 1

PRICE ELASTICITIES OF DEMAND, MONOPOLY RENTS AND COMPETITION POLICY

1.1 PRICE ELASTICITIES OF DEMAND FOR PROFESSIONAL SERVICES

The earnings functions estimated in Parts II and III of this study, for physician specialties and for professional, technical, managerial and other occupations, respectively, were derived as the products of underlying demand and production functions for professional services. However, because of the absence of direct measures of output, identification of the structural parameters of these underlying functions was effectively precluded.

Even in the absence of estimates of demand and production function parameters, the reduced- form earnings function parameters permit substantial inferences concerning the markets for professional services. Specifically, elasticities of earnings with respect to hours of work provide suggestive evidence concerning conditions of demand confronting individual practitioners. Essentially, if individual practitioners confronted perfectly competitive markets, then the elasticity of earnings with respect to hours of work (defined, simply, as the ratio of the percentage change in earnings to the percentage change in hours) would equal the elasticity of service output with respect to hours, i.e., the price which the practitioner could command would not be affected by changes in his work effort. Thus, while differences in earnings- hours elasticities across occupations and professional specialties may be due in part to differences in the production of professional services,

major differences are more likely reflective of differences in demand and hence in the structure of markets.

The general patterns revealed by the estimated earnings- hours elasticities are certainly consistent with a priori conceptions of differences in the nature of demand and in market structure across occupations and specialties. Thus, substantially higher elasticities were found in the nonprofessional occupations than in the professional, technical and managerial occupations, for which product differentiation at the practitioner level would be expected to be more significant. Similarly, earnings- hours elasticities were found to be substantially greater in primary- care medical specialties than in other physician specialties, suggesting significantly greater competition among primary- care specialists.

As developed in equations II.1.4(a, b and c), the elasticity of earnings with respect to hours can be expressed as a function of the elasticity of demand with respect to price and the elasticity of output with respect to hours. Specifically,

$$\eta_{Y,H} = \eta_{Q,H} (1 - \eta_{Q,P}^{-1}) \qquad \text{(IV.1.1)}$$

or

$$\eta_{Q,P} = \eta_{Q,H} / (\eta_{Q,H} - \eta_{Y,H}) \qquad \text{(IV.1.2)}$$

where $\eta_{Q,P}$ is the price elasticity of demand,
$\eta_{Q,H}$ is the elasticity of output with respect to hours, and
$\eta_{Y,H}$ is the elasticity of earnings with respect to hours.

Of these three elasticities, only an estimate of the latter can be derived from the estimated parameters of the earnings function. However, conditional

on independent estimates of or assumptions concerning the elasticity of output with respect to hours, implied price elasticities of demand can be derived.

1.2 CONDITIONAL DERIVED PRICE ELASTICITIES OF DEMAND

Unfortunately, relatively little empirical evidence is available concerning production functions of professional services. Only in the case of medical practice have direct estimates of production functions been attempted [Kimbell and Lorant (1973), and Reinhardt (1975)]. However, these two studies reached remarkably similar conclusions regarding the elasticity of output with respect to physician practice hours, with estimates of between 0.65 and 0.85 when output was measured in terms of patient visits (office or total, respectively).

Because an elasticity of output with respect to hours in excess of unity appears implausible, it is reasonable to ignore elasticities greater than unity. Also, although nothing in principle prevents the production function elasticity from approaching zero or becoming negative, a value of 0.5 appears to represent a reasonable lower bound for examination. Thus, a range of implied price elasticities of demand can be derived from the estimated elasticities of earnings with respect to hours, conditional on stipulated elasticities of output with respect to hours in the 0.5 to 1.0 interval.

Table IV.1.1 presents the physician- specialty estimates of the elasticity of earnings with respect to hours, evaluating the earnings functions at three ages (35, 50 and 65), and derives implied values of the price elasticity of demand for assumed values of the elasticity of output with respect to hours of 0.5, 0.625, 0.75, 0.875 and 1.0. Corresponding estimates for the 30 CPS occupations, evaluating the earnings functions for 1977, are presented in Table IV.1.2.

Table IV.1.1
Conditional Derived Physician Specialty Price Elasticities of Demand

ALLERGY

AGE =	35	50	65
ETA(Y,H) =	0.136	0.148	0.163
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.374	1.420	1.484
0.625	1.278	1.310	1.353
0.750	1.221	1.246	1.278
0.875	1.184	1.204	1.229
1.000	1.157	1.174	1.195

CARDIOL

AGE =	35	50	65
ETA(Y,H) =	0.084	0.076	0.066
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.202	1.179	1.152
0.625	1.155	1.138	1.118
0.750	1.126	1.113	1.096
0.875	1.106	1.095	1.082
1.000	1.092	1.082	1.071

DERMATOL

AGE =	35	50	65
ETA(Y,H) =	0.153	0.162	0.176
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.441	1.479	1.543
0.625	1.324	1.350	1.392
0.750	1.256	1.276	1.307
0.875	1.212	1.227	1.252
1.000	1.181	1.193	1.214

GASTROEN

AGE =	35	50	65
ETA(Y,H) =	0.328	0.325	0.321
	ETA	ETA	ETA
ETA(Q,H)			
0.500	2.907	2.857	2.793
0.625	2.104	2.083	2.056
0.750	1.777	1.765	1.748
0.875	1.600	1.591	1.579
1.000	1.488	1.481	1.473

GEN PRAC

AGE =	35	50	65
ETA(Y,H) =	0.199	0.235	0.323
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.661	1.887	2.825
0.625	1.467	1.603	2.070
0.750	1.361	1.456	1.756
0.875	1.294	1.367	1.585
1.000	1.248	1.307	1.477

GEN SURG

AGE =	35	50	65
ETA(Y,H) =	0.007	0.001	0.028
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.014	1.002	1.059
0.625	1.011	1.002	1.047
0.750	1.009	1.001	1.039
0.875	1.008	1.001	1.033
1.000	1.007	1.001	1.029

INT MED

AGE =	35	50	65
ETA(Y,H) =	0.175	0.180	0.201
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.538	1.563	1.672
0.625	1.389	1.404	1.474
0.750	1.304	1.316	1.366
0.875	1.250	1.259	1.298
1.000	1.212	1.220	1.252

NEUROSUR

AGE =	35	50	65
ETA(Y,H) =	0.048	0.055	0.184
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.106	1.124	1.582
0.625	1.083	1.096	1.417
0.750	1.068	1.079	1.325
0.875	1.058	1.067	1.266
1.000	1.050	1.058	1.225

OB GYN

AGE =	35	50	65
ETA(Y,H) =	0.130	0.150	0.214
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.351	1.429	1.748
0.625	1.263	1.316	1.521
0.750	1.210	1.250	1.399
0.875	1.174	1.207	1.324
1.000	1.149	1.176	1.272

OPHTHAL

AGE =	35	50	65
ETA(Y,H) =	0.124	0.160	0.232
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.330	1.471	1.866
0.625	1.248	1.344	1.590
0.750	1.198	1.271	1.448
0.875	1.165	1.224	1.361
1.000	1.142	1.190	1.302

ORTHOSUR

AGE =	35	50	65
ETA(Y,H) =	0.117	0.137	0.195
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.305	1.377	1.639
0.625	1.230	1.281	1.453
0.750	1.185	1.223	1.351
0.875	1.154	1.186	1.287
1.000	1.133	1.159	1.242

OTOLARYN

AGE =	35	50	65
ETA(Y,H) =	0.225	0.223	0.310
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.818	1.805	2.632
0.625	1.563	1.555	1.984
0.750	1.429	1.423	1.705
0.875	1.346	1.342	1.549
1.000	1.290	1.287	1.449

PEDIATRI			
AGE =	35	50	65
ETA(Y,H) =	0.127	0.130	0.145
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.340	1.351	1.408
0.625	1.255	1.263	1.302
0.750	1.204	1.210	1.240
0.875	1.170	1.174	1.199
1.000	1.145	1.149	1.170

PSYCHIAT			
AGE =	35	50	65
ETA(Y,H) =	0.338	0.332	0.360
	ETA	ETA	ETA
ETA(Q,H)			
0.500	3.086	2.976	3.571
0.625	2.178	2.133	2.358
0.750	1.820	1.794	1.923
0.875	1.629	1.611	1.699
1.000	1.511	1.497	1.563

UROLOGY			
AGE =	35	50	65
ETA(Y,H) =	0.091	0.061	0.021
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.222	1.139	1.044
0.625	1.170	1.108	1.035
0.750	1.138	1.089	1.029
0.875	1.116	1.075	1.025
1.000	1.100	1.065	1.021

ANESTHES			
AGE =	35	50	65
ETA(Y,H) =	-0.045	-0.042	-0.001
	ETA	ETA	ETA
ETA(Q,H)			
0.500	0.917	0.923	0.998
0.625	0.933	0.937	0.998
0.750	0.943	0.947	0.999
0.875	0.951	0.954	0.999
1.000	0.957	0.960	0.999

PATHOLOG			
AGE =	35	50	65
ETA(Y,H) =	-0.014	-0.009	-0.009
	ETA	ETA	ETA
ETA(Q,H)			
0.500	0.973	0.982	0.982
0.625	0.978	0.986	0.986
0.750	0.982	0.988	0.988
0.875	0.984	0.990	0.990
1.000	0.986	0.991	0.991

RADIOLOG			
AGE =	35	50	65
ETA(Y,H) =	0.041	0.040	0.043
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.089	1.087	1.094
0.625	1.070	1.068	1.074
0.750	1.058	1.056	1.061
0.875	1.049	1.048	1.052
1.000	1.043	1.042	1.045

In light of the relatively low estimated elasticities of earnings with respect to hours found for the physician specialties, the derived price elasticities of demand are relatively insensitive to the assumed values of the output- hours elasticity in the range 0.75 to 1.0. In no specialty is a price elasticity of demand greater than 2.0 implied when the output elasticity exceeds 0.75, and even at lower output elasticities the implied price elasticities exceed 2.0 only in four specialties (gastroenterology and psychiatry at all ages, general practice and otolaryngology only at age 65).

The 30 CPS occupations exhibit substantial variation in derived price elasticities of demand. However, in most cases these are substantially above those estimated for physician specialties. It is particularly notable that, for the eight non- professional/technical/managerial (nonPTM) occupations, only farm laborers exhibit estimated price elasticities even approximating the values found for physician specialties.[1]

A very revealing picture emerges when the physician specialties and CPS occupations are ranked by derived price elasticity of demand. Ideally, these elasticities would be derived utilizing specialty- and occupation- specific estimates of output- hours elasticities. In the absence of such estimates,

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[1] It will be observed that, for a number of occupations, negative price elasticities are derived, generally when a relatively low output elasticity is stipulated. This means only that the observed earnings elasticity implies a positively- sloped demand function when the stipulated output elasticity is assumed. In the nonprofessional occupations, in which overtime compensation at rates one- and one- half to two times basic wage rates is common, an negative estimated demand elasticity at levels of hours above the "norm" might not be implausible. However, among the selfemployed and "exempt" employees, i.e., those not covered by wage and hours laws and union contracts, this factor would not be operative. In these occupations a negative price elasticity implies the implausibility of the assumed output elasticity. It might also be noted that, as the output elasticity is reduced, the implied price elasticity rises, at some critical value becomes infinite, and below that critical value is negative but declining in absolute value.

Table IV.1.2

Conditional Derived Occupational Price Elasticities of Demand

ACCOUNT			
AGE =	35	50	65
ETA(Y,H) =	0.727	0.667	0.623
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-2.203	-2.994	-4.065
0.625	-6.127	-114.881	312.504
0.750	32.609	9.036	5.906
0.875	5.912	4.207	3.472
1.000	3.663	3.003	2.653

ENGINEER			
AGE =	35	50	65
ETA(Y,H) =	0.556	0.534	0.709
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-8.929	-114.706	-2.392
0.625	9.058	6.868	-7.440
0.750	3.866	3.472	118.293
0.875	2.743	2.566	5.271
1.000	2.252	2.146	3.436

ARCHITEC			
AGE =	35	50	65
ETA(Y,H) =	1.264	0.742	-0.394
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-0.654	-2.066	0.559
0.625	-0.978	-5.342	0.613
0.750	-1.459	93.750	0.656
0.875	-2.249	6.579	0.690
1.000	-3.788	3.876	0.717

LAWYERS			
AGE =	35	50	65
ETA(Y,H) =	0.667	0.282	0.384
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-2.994	2.294	4.310
0.625	-114.881	1.822	2.593
0.750	9.036	1.603	2.049
0.875	4.207	1.476	1.782
1.000	3.003	1.393	1.623

COMPUTER			
AGE =	35	50	65
ETA(Y,H) =	0.715	-0.269	-2.064
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-2.326	0.650	0.195
0.625	-6.944	0.699	0.232
0.750	21.429	0.736	0.267
0.875	5.469	0.765	0.298
1.000	3.509	0.788	0.326

LIBSOCSC			
AGE =	35	50	65
ETA(Y,H) =	1.456	0.863	-0.422
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-0.523	-1.377	0.542
0.625	-0.752	-2.626	0.597
0.750	-1.062	-6.637	0.640
0.875	-1.506	72.917	0.675
1.000	-2.193	7.299	0.703

Table IV.1.2, cont. (2)

MATHSPEC

AGE =	35	50	65
ETA(Y,H) =	0.427	-0.066	-0.219
	ETA	ETA	ETA
ETA(Q,H)			
0.500	6.849	0.883	0.695
0.625	3.157	0.904	0.741
0.750	2.322	0.919	0.774
0.875	1.953	0.930	0.800
1.000	1.745	0.938	0.820

SCIENCE

AGE =	35	50	65
ETA(Y,H) =	0.330	0.401	0.351
	ETA	ETA	ETA
ETA(Q,H)			
0.500	2.941	5.051	3.356
0.625	2.119	2.790	2.281
0.750	1.786	2.149	1.880
0.875	1.606	1.846	1.670
1.000	1.493	1.669	1.541

ENG TECH

AGE =	35	50	65
ETA(Y,H) =	0.622	0.586	1.223
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-4.098	-5.814	-0.692
0.625	208.332	16.026	-1.045
0.750	5.859	4.573	-1.586
0.875	3.458	3.028	-2.514
1.000	2.646	2.415	-4.484

HLTHPROF

AGE =	35	50	65
ETA(Y,H) =	0.164	-0.179	0.013
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.488	0.736	1.027
0.625	1.356	0.777	1.021
0.750	1.280	0.807	1.018
0.875	1.231	0.830	1.015
1.000	1.196	0.848	1.013

PHYSICIA

AGE =	35	50	65
ETA(Y,H) =	-0.093	0.359	0.115
	ETA	ETA	ETA
ETA(Q,H)			
0.500	0.843	3.546	1.299
0.625	0.870	2.350	1.225
0.750	0.890	1.918	1.181
0.875	0.904	1.696	1.151
1.000	0.915	1.560	1.130

CLERGY

AGE =	35	50	65
ETA(Y,H) =	0.161	-0.027	0.262
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.475	0.949	2.101
0.625	1.347	0.959	1.722
0.750	1.273	0.965	1.537
0.875	1.225	0.970	1.427
1.000	1.192	0.974	1.355

HLTHTECH			
AGE =	35	50	65
ETA(Y,H) =	0.444	1.066	2.326
	ETA	ETA	ETA
ETA(Q,H)			
0.500	8.929	-0.883	-0.274
0.625	3.453	-1.417	-0.367
0.750	2.451	-2.373	-0.476
0.875	2.030	-4.581	-0.603
1.000	1.799	-15.152	-0.754

OTH TECH			
AGE =	35	50	65
ETA(Y,H) =	0.253	-0.091	-0.157
	ETA	ETA	ETA
ETA(Q,H)			
0.500	2.024	0.846	0.761
0.625	1.680	0.873	0.799
0.750	1.509	0.892	0.827
0.875	1.407	0.906	0.848
1.000	1.339	0.917	0.864

COLL FAC			
AGE =	35	50	65
ETA(Y,H) =	0.485	0.252	0.444
	ETA	ETA	ETA
ETA(Q,H)			
0.500	33.333	2.016	8.929
0.625	4.464	1.676	3.453
0.750	2.830	1.506	2.451
0.875	2.244	1.404	2.030
1.000	1.942	1.337	1.799

OTHTEACH			
AGE =	35	50	65
ETA(Y,H) =	0.216	0.338	1.151
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.761	3.086	-0.768
0.625	1.528	2.178	-1.188
0.750	1.404	1.820	-1.870
0.875	1.328	1.629	-3.170
1.000	1.276	1.511	-6.623

WRITERS			
AGE =	35	50	65
ETA(Y,H) =	0.478	0.242	0.225
	ETA	ETA	ETA
ETA(Q,H)			
0.500	22.727	1.938	1.818
0.625	4.252	1.632	1.563
0.750	2.757	1.476	1.429
0.875	2.204	1.382	1.346
1.000	1.916	1.319	1.290

PUBADMIN			
AGE =	35	50	65
ETA(Y,H) =	1.094	0.901	0.490
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-0.842	-1.247	50.000
0.625	-1.333	-2.264	4.630
0.750	-2.180	-4.967	2.885
0.875	-3.995	-33.654	2.273
1.000	-10.638	10.101	1.961

Table IV.1.2, cont. (4)

BANK OFF			
AGE =	35	50	65
ETA(Y,H) =	0.614	0.494	0.079
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-4.386	83.334	1.188
0.625	56.818	4.771	1.145
0.750	5.515	2.930	1.118
0.875	3.352	2.297	1.099
1.000	2.591	1.976	1.086

HLTHEDAD			
AGE =	35	50	65
ETA(Y,H) =	0.460	0.378	0.453
	ETA	ETA	ETA
ETA(Q,H)			
0.500	12.500	4.098	10.638
0.625	3.788	2.530	3.634
0.750	2.586	2.016	2.525
0.875	2.108	1.761	2.073
1.000	1.852	1.608	1.828

TRADEMAN			
AGE =	35	50	65
ETA(Y,H) =	0.440	0.348	0.321
	ETA	ETA	ETA
ETA(Q,H)			
0.500	8.333	3.289	2.793
0.625	3.378	2.256	2.056
0.750	2.419	1.866	1.748
0.875	2.011	1.660	1.579
1.000	1.786	1.534	1.473

MAN ADMI			
AGE =	35	50	65
ETA(Y,H) =	0.402	0.228	0.246
	ETA	ETA	ETA
ETA(Q,H)			
0.500	5.102	1.838	1.969
0.625	2.803	1.574	1.649
0.750	2.155	1.437	1.488
0.875	1.850	1.352	1.391
1.000	1.672	1.295	1.326

SALES			
AGE =	35	50	65
ETA(Y,H) =	0.554	0.513	0.757
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-9.259	-38.462	-1.946
0.625	8.803	5.580	-4.735
0.750	3.827	3.165	-107.142
0.875	2.726	2.417	7.415
1.000	2.242	2.053	4.115

CLERICAL			
AGE =	35	50	65
ETA(Y,H) =	0.891	0.938	1.081
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-1.279	-1.142	-0.861
0.625	-2.350	-1.997	-1.371
0.750	-5.319	-3.989	-2.266
0.875	-54.688	-13.889	-4.248
1.000	9.174	16.129	-12.346

Table IV.1.2, cont. (5)

CRAFTS			
AGE =	35	50	65
ETA(Y,H) =	0.575	0.490	0.778
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-6.667	50.000	-1.799
0.625	12.500	4.630	-4.085
0.750	4.286	2.885	-26.786
0.875	2.917	2.273	9.021
1.000	2.353	1.961	4.505

OPERATIV			
AGE =	35	50	65
ETA(Y,H) =	0.749	0.703	0.861
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-2.008	-2.463	-1.385
0.625	-5.040	-8.013	-2.648
0.750	750.010	15.957	-6.757
0.875	6.944	5.087	62.500
1.000	3.984	3.367	7.194

TRANS OP			
AGE =	35	50	65
ETA(Y,H) =	0.575	0.546	0.841
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-6.667	-10.870	-1.466
0.625	12.500	7.911	-2.894
0.750	4.286	3.676	-8.242
0.875	2.917	2.660	25.735
1.000	2.353	2.203	6.289

LABORERS			
AGE =	35	50	65
ETA(Y,H) =	0.668	0.720	0.889
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-2.976	-2.273	-1.285
0.625	-14.535	-6.579	-2.367
0.750	9.146	25.000	-5.396
0.875	4.227	5.645	-62.500
1.000	3.012	3.571	9.009

FARM LAB			
AGE =	35	50	65
ETA(Y,H) =	0.120	0.244	0.434
	ETA	ETA	ETA
ETA(Q,H)			
0.500	1.316	1.953	7.576
0.625	1.238	1.640	3.272
0.750	1.190	1.482	2.373
0.875	1.159	1.387	1.984
1.000	1.136	1.323	1.767

SERVICE			
AGE =	35	50	65
ETA(Y,H) =	0.679	0.696	0.877
	ETA	ETA	ETA
ETA(Q,H)			
0.500	-2.793	-2.551	-1.326
0.625	-11.574	-8.803	-2.480
0.750	10.563	13.889	-5.906
0.875	4.464	4.888	-437.506
1.000	3.115	3.289	8.130

however, an output elasticity of 0.75 is arbitrarilly assumed for each specialty and occupation. To simplify the examination, the following rankings utilize the derived price elasticities for 50 year- old specialty/occupation incumbents.

In addition to indicating the derived price elasticities of demand, the hours- adjusted present values of lifetime earnings (evaluating the earnings functions at the mean of age- specific hours across the 22 professional, technical and managerial occupations) are also presented. The 30 CPS occupations are further differentiated into high (H), medium (M) and low (L) lifetime- earnings groups, using the 1977 classification presented in Part III, Chapter 2. The 18 physician specialties are similarly decomposed into high, medium and low lifetime earnings groups on the basis of the rank ordering of 1977 hours- adjusted present values, with one- third allocated to each class.

	$\eta_{Q,P}$	PV_A
Health technicians	-2.37	$164.1 (L)
Clerical	-3.99	182.5
Public administrators	-4.97	182.9 (L)
Librar., soc. sc.	-6.64	232.8 (M)
Architects	93.75	226.2 (M)
Nonfarm laborers	25.00	186.4
Operatives	15.96	191.0
Service	13.89	140.3
------------------------	--------	----------------
Accountants	9.04	219.2 (M)
Engineering technicians	4.57	192.3 (L)
Transport operatives	3.68	195.8
Engineers	3.47	235.1 (M)
Sales	3.17	202.7
Bank officers	2.93	243.0 (H)
Crafts	2.89	208.7
Life & phys. scientists	2.15	206.2 (M)
Health & ed. admin.	2.02	224.0 (M)
------------------------	--------	----------------
Physicians	1.92	307.9 (H)
Trade managers	1.87	207.7 (M)
Teachers (noncollege)	1.82	165.4 (L)
Lawyers	1.60	254.0 (H)
College faculty	1.51	170.3 (L)
Farm laborers	1.48	127.5
Writers, et al.	1.48	196.3 (L)
Oth. managers, admin.	1.44	231.2 (M)
Clergy	0.97	102.5 (L)
Math. specialists	0.92	227.9 (M)
Other technicians	0.89	167.1 (L)
Hlth. prof. (ex. phys.)	0.81	317.9 (H)
Computer specialists	0.74	211.0 (M)

As indicated above by the dashed lines, the rank ordering of the derived price elasticities for the 30 CPS occupations can be arbitrarily decomposed into high, medium and low elasticity segments, with the former defined as including elasticities greater than 10.0 and the latter defined as including elasticities less than 2.0. The implications of the rank ordering are conveniently summarized by examining the distributions of the PTM and nonPTM occupations and of the high (H), medium (M) and low (L) lifetime earnings PTM occupations across the three elasticity classes:

High elasticity class:	50% of nonPTM occupations	25% of L PTM occupations
	18% of PTM occupations	20% of M PTM occupations
		0% of H PTM occupations
Med. elasticity class:	37.5% of nonPTM occupations	12.5% of L PTM occupat's
	27% of PTM occupations	40% of M PTM occupations
		25% of H PTM occupations
Low elasticity class:	12.5% of nonPTM occupations	62.5% of L PTM occupat's
	55% of PTM occupations	40% of M PTM occupations
		75% of H PTM occupations

The differential distributions of the PTM and nonPTM occupations are particularly striking, with four of the eight nonPTM occupational groups falling in the high elasticity class while only one (farm laborers) is found in the low elasticity class. Conversely, 12 of the 22 PTM occupations are found in the low elasticity class, while only four exhibit elasticities in the high range.

The distribution of the PTM lifetime earnings groups (low, medium and high) across the elasticity classes is less clearcut. Although none of the high income occupations is in the high elasticity class, while three of the four high income occupations fall in the lowest elasticity class, the latter also accounts for five of the eight low income occupations and for four of the ten medium income occupations. At most, it would appear that a low elasticity is a "necessary" but not sufficient characteristic of high income occupations. This result is not particularly surprising, in that extreme individual product differentiation conjoined with freedom of entry might well result in low individual elasticities of demand and low income (e.g., clergy). Certainly, monopolistic competition need not imply the existence of economic rents, although a less than infinitely elastic demand is a necessary condition for the receipt of rents.

These findings for the 30 CPS occupations are mirrored in the results of the elasticity ranking of the physician specialties. In addition to the derived, output- elasticity- conditional price elasticity of demand, the hours- adjusted present value of lifetime earnings and the high, medium and low lifetime earnings indicator, the following also identifies (a) medical specialties (MED), surgical specialties (SURG) and hospital- based specialties (HOSP).

	·Q,P	PV_A		
Psychiatry	1.79	$422.3	(L)	MED
Gastroenterology	1.77	434.8	(L)	MED
General practice	1.46	427.5	(L)	MED
Otolaryngology	1.42	526.7	(H)	SURG
Internal medicine	1.32	463.9	(L)	MED
Dermatology	1.28	486.6	(M)	MED
Opthalmology	1.27	571.6	(H)	SURG
Obstetrics/gynecology	1.25	504.5	(M)	SURG
Allergy	1.25	488.0	(M)	MED
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Orthopedic surgery	1.22	577.0	(H)	SURG
Pediatrics	1.21	393.6	(L)	MED
Cardiology	1.11	587.9	(H)	MED
Urology	1.09	485.8	(M)	SURG
Neurological surgery	1.08	599.2	(H)	SURG
Radiology	1.06	493.1	(M)	HOSP
General surgery	1.00	533.2	(H)	SURG
Pathology	0.99	504.3	(M)	HOSP
Anesthesiology	0.95	448.7	(L)	HOSP

While the distribution of price elasticities of demand is more continuous for the medical specialties than for the CPS occupations, it is possible to arbitrarilly divide the distribution into two equal components, as indicated by the dashed line separating "high" and "low" elasticity specialties. The distribution of the lifetime earnings classes and of the medical, surgical and hospital- based specialties over the two elasticity categories is again revealing:

High elasticity specialties:
- 1/3 of "high" earnings specialties
- 1/2 of "med." earnings specialties
- 2/3 of "low" earnings specialties
- 3/4 of medical specialties
- 2/7 of surgical specialties
- 0/3 of hospital- based specialties

Low elasticity specialties:
- 2/3 of "high" earnings specialties
- 1/2 of "med." earnings specialties
- 1/3 of "low" earnings specialties
- 1/4 of medical specialties
- 5/7 of surgical specialties
- 3/3 of hospital- based specialties

Again, it appears reasonable to conclude that there is a significant association between the level of the derived price elasticity of demand and the level of earnings. Similarly, the medical specialties reveal significantly higher elasticities than the surgical specialties, while elasticities of the hospital- based specialties are extremely low. With relatively moderate earnings (by physician standards) in the hospital based specialties, the price elasticity of demand can be considered only a necessary, not sufficient, condition for high relative earnings, confirming the conclusion of the CPS occupational analysis.

1.3 CHANGES IN THE DERIVED PRICE ELASTICITIES OF DEMAND WITH AGE

As algebraically formulated in Part II, Chapter 1, the underlying professional earnings model assumes that the price elasticity of demand is invariant with age and that age- related changes in the elasticity of earnings with respect to hours reflect only production- function shifts related to age. However, this simplified formulation was utilized only for convenience. In the absence of direct estimates of the production and demand functions, there is no *a priori* basis for attributing the changes in the earnings elasticity with age to either production function or demand effects.

It is certainly not implausible to believe that the demand functions confronting individual practitioners may in fact shift systematically with

age. Early in a professional practice, prior to the establishment of a "reputation," there may be relatively little basis on which potential clients can differentiate the services of alternative practitioners, suggesting that the price elasticity of demand confronting the practitioner may decline as he is able to differentiate himself from others. Conversely, the young practitioner may be differentiated by, e.g., the school which he attended, the other professionals with whom he practices or the current vogue of his subspecialization, any of which might result in a relatively low elasticity of demand; however, the longer he has been in practice the less important these factors may appear to potential clients, suggesting that the price elasticity of demand may rise. Finally, if age _per se_ is considered a negative attribute, at least beyond some point, then the price- elasticity of demand may well rise with age. In short, an examination of interoccupational and interspecialty differences in age- related price elasticities of demand may not be an uninteresting exercise, albeit an exercise which requires the assumption that the elasticity of output with respect to hours (the production function) does not shift systematically with age.

The following tabulation of physician specialties and occupations provides an overview of age- related changes in derived price elasticities of demand. Those instances in which a change in the derived price elasticity exceeds 10 percent of its original value, assuming an elasticity of output with respect to hours of 0.75, are indicated by asterisks (**); a change in excess of 10 percent between 35 and 50 but of less than 10 percent between 50 and 65 is denoted (*-) and conversely (-*).

Rise 35 to 50 Rise 50 to 65	Decline 35 to 50 Rise 50 to 65	Rise 35 to 50 Decline 50 to 65	Decline 35 to 50 Decline 50 to 65
Allergy	Gen. surgery		Cardiology
Dermatology	Otolaryn. (-*)		Gastroenterol.
Gen. prac. (-*)	Psychiatry		Urology
Int. medicine	Radiology		
Neuro. surg.(-*)			
Ob./gyn. (-*)			
Opthalmol. (-*)			
Ortho. surg.(-*)			
Pediatrics			
Anesthesiology			
Pathology			

The only substantial age- related changes in price elasticities confronting physicians involve increases in elasticities between the ages of 50 and 65. In only three specialties (cardiology, gastroenterology and urology) are these elasticities found to decrease, and then by less than 10 percent. And in only four specialties (general surgery, otolaryngology, psychiatry and radiology) are the 50 to 65 increases preceeded by (less than 10 percent) declines between the ages of 35 and 50. Thus, the common pattern is for the derived price elasticities of demand to increase continuously with age, suggesting increasing competitive pressure as the physician ages.

A much more diverse pattern is revealed by the 30 CPS occupations.

Rise 35 to 50 Rise 50 to 65	Decline 35 to 50 Rise 50 to 65	Rise 35 to 50 Decline 50 to 65	Decline 35 to 50 Decline 50 to 65
Teachers (**)	Engineers (**)	Lib,socsc (-*)	Account. (**)
Laborers (**)	Lawyers (**)	Life,phy sc(**)	Architects (-*)
Farm lab. (**)	Eng. tech. (**)	Physicians (**)	Computer spec(**)
Service (-*)	Hlth. prof.(**)	Hlth.tech.(*-)	Math spec (**)
	Clergy (**)	Pub. ad. (-*)	Oth. tech.(*-)
	Faculty (**)		Writers etal.(*-)
	Hlth ed ad (**)		Bank off. (**)
	Man/admin (*-)		Trade man.(*-)
	Sales (**)		Clerical
	Crafts (**)		
	Operatives(**)		
	Trans. op.(**)		

In 13 of the 22 PTM occupations the price elasticity is found to decline between the ages of 50 and 65. Thus, in these occupations it appears that the practitioner is able to increasingly differentiate his service from the services of others. Interestingly, the nonPTM occupations, for which much higher elasticities are derived in any event, almost invariably experience increases in the price elasticity of demand with age, at least beyond the age of 50.

1.4 PROCOMPETITIVE POLICY, MONOPOLY RENTS AND THE SUPPLY OF PROFESSIONAL SERVICES

Increasing interest has recently focused on public policies designed to foster competition in the delivery of professional services as a mechanism by which to reduce the prices of these services. Thus, for example, the Federal Trade Commission has constrained the power of professional associations to limit or preclude advertising and overt price competition, while Federal initiatives such as encouragement of prepaid medical plans have been justified as mechanisms by which to encourage competition between providers of health care services. A frequent objection of opponents of proposals for increased competition is that the supply of professional (especially physician) services will be reduced if prices and earnings decline. In effect, opponents of increased competition argue that effective compensation is not excessively high when the level of effort of the practitioner is taken into account, that a reduction in effective compensation will reduce the average practitioner's work effort and supply of services, and therefore that either levels of service will decline or costly augmentation of the corps of practitioners will be required.

The conclusion of the foregoing analysis (Chapters 2 of Parts II and III) is that effective compensation in many professional occupations is substantially greater than required to compensate practitioners for their human capital investments and for their (admittedly relatively high) levels of effort (hours of work). However, even if the average practitioner receives significant economic rents for his inframarginal hours of work, it will nonetheless be true that his work effort may decline if the compensation received for the marginal unit of work effort (hour of work) declines. Thus, a procompetitive policy might result in a reduction in service supply of the individual practitioner.

On consideration, however, it can be argued that a procompetitive policy is unlikely to reduce either the individual practitioner's supply of services or the aggregate supply of services in the market. Monopoly rents can be commanded only if the entry of potential suppliers is restricted. Given restrictions on entry, monopoly rents can be increased by constraining the competition between those few admitted to practice, i.e., by reducing the elasticities of demand confronted by individual practitioners. To reduce barriers to entry while leaving in place restrictions on practitioner competition might well result in reductions in levels of service output on the part of individual practitioners. However, if entry barriers are not reduced, increased competition on the part of those admitted to practice can only result in an increase in the supply of practitioner services. and a reduction (but not elimination) of monopoly rents. Monopoly rents can be eliminated and the individual practitioner's work effort can be maintained or even increased if entry barriers are eliminated and if, simultaneously, practitioner competition is sufficiently increased.

Specifically, professional practitioners will reduce their labor supply only if marginal wage rates are reduced. However, in the absence of reductions in entry barriers, increased competition will have the effect of raising rather than lowering marginal wage rates because the elasticity of demand confronting the practitioner will have increased. Reductions in entry barriers without provision for increased competition may conceivably reduce marginal wage rates, but simultaneous actions to facilitate entry and enhance competition may simultaneously reduce or eliminate monopoly rents and increase marginal wage rates. wage rates. If the marginal wage rate is unchanged or increases, then the substitution effect will lead to correspondingly unchanged or increased labor supply, while the income effect of the reduction in monopoly rents (earnings) will serve to increase labor supply. Thus, a condition for a nonnegative change in labor supply in the face of increased competition and facilitated entry is that the marginal wage rate not decline.

Essentially, to the degree to which it is effective a policy of facilitating entry and enhancing competition will alter the demand function confronting the individual practitioner (equation II.1.1a) from

$$P = Q^{a_1} e^{a_0 + a_2 X_d} \qquad \text{(II.1.1a)}$$

to

$$P = d_0 Q^{d_1 a_1} e^{a_0 + a_2 X_d} \qquad \text{(IV.1.3)}$$

where d_1 $(0 \leq d_1 < 1)$ reflects the effects of increased competition on the elasticity of demand, while d_0 $(0 \leq d_0 < 1)$ reflects a multiplicative shift in the demand function (due primarily to freedom of entry).[2]

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[2] More generally, policy changes may impinge on any of the coefficients in the demand function. However, as will become clear, the only coefficient of relevance for present purposes is the elasticity coefficient, a_1, and its policy- induced scalar, d_1.

Denoting earnings and the marginal wage after the change in demand by Y' and w'_n, respectively,

(IV.1.4) $w'_n = [b_1(1+d_1a_1)H^{-1} + b_2(1+d_1a_1)]Y'$

If the monopoly rents previously accruing to the practitioner are to be eliminated by the reduction in entry barriers and increase in competition, then Y' must be equal to fY, where the factor f is equal to one minus the ratio of monopoly rents to the expected value of lifetime earnings prior to the implementation of the new policy.

If the marginal wage rate after the increase in competition is to equal the marginal wage rate previously confronted, then

(IV.1.5) $(1+d_1a_1)(b_1H^{-1} + b_2)\, fY = (1+a_1)(b_1H^{-1} + b_2)\, Y$

or

(IV.1.6) $d_1 = (1 + a_1 - f)/(a_1f)$

Prior to the change in demand, the price elasticity of demand is

(IV.1.7) $\eta_{Q,P} = -1/a_1\ ,\ a_1 \leq 0$

After the change, this elasticity becomes

(IV.1.8) $\eta'_{Q,P} = -1/(d_1a_1)\ ,\ d_1a_1 \leq 0$

Substituting the value of d_1 consistent with an unchanged marginal wage rate (equation IV.1.6) into equation IV.1.8, the ex post elasticity of demand required to obtain (a) an elimination of the monopoly rents incorporated in expected lifetime earnings and (b) an unchanged marginal wage rate is derived:

(IV.1.9) $\eta'_{Q,P} = -f/(1 + a_1 - f)$

The magnitude of the increase in competition required to simultaneously eliminate monopoly rents and maintain levels of work effort is essentially measured by the relationship of η' to η. Thus, a small change should be achievable without radical interventions into market functioning, while a

large change in the elasticity of demand confronting the individual practitioner may require major changes in market structure.

The *ex post* price elasticities of demand required for unchanged marginal wage rates at actual hours of work are presented in Table IV.1.3 for physician specialties and in Table IV.1.4 for those CPS professional, technical and managerial occupations for which the hours- adjusted present value of lifetime earnings exceeds the PTM mean of $217.8 thousand. In the case of the physician specialties two alternative sets of these critical *ex post* elasticities (denoted η' and η'', respectively) are derived. The first considers a situation in which a procompetitive policy is utilized to eliminate monopoly rents associated with specialty practice relative to general practice. In this case the factor f is defined as the ratio of the hours- adjusted present value of general practice earnings to the hours- adjusted present value of specialty practice earnings (in each case evaluating the earnings function at the geometric mean across physician specialties at each age). In the second, the factor f is defined as the ratio of the mean hours- adjusted present value of lifetime earnings across the 22 CPS PTM occupations to the hours- adjusted present value of physician specialty lifetime earnings (evaluating the earnings functions at the geometric mean of hours across the 22 PTM occupations at each age); thus, the second identifies the critical value of the *ex post* elasticity required to reduce the present value of physician earnings to the mean across professional, technical and managerial occupations. For the eleven CPS PTM occupations for which the hours- adjusted present value of lifetime earnings exceeds the PTM mean, the factor f is defined as the ratio of the occupational present value of lifetime earnings to the mean present value across the PTM occupations. The critical

ex post demand elasticities are again derived under alternative assumptions concerning the elasticity of output with respect to hours between 0.5 and 1.0 and for the ages 35, 50 and 65. For comparison purposes the derived ex ante value of the price elasticity of demand (for each assumed value of the elasticity of output with respect to hours at each age) is also presented.

A perusal of Table IV.1.3 will indicate the relatively minor increases in price elasticities of demand required if specialty earnings are to be reduced to levels in general practice without inducing a decline in the marginal wage rate. As above, the required changes can be summarized by focusing on a 50 year- old physician confronting an elasticity of output with respect to hours of 0.75. The following indicates the ex post required elasticity and the percentage increase in the elasticity from its ex ante value, considering reductions in earnings to both general practice and PTM occupational mean levels:

	f	η'	% change	f	η''	% change
Allergy	0.93	1.27	1.9%	0.45	1.79	43.9%
Cardiology	0.79	1.15	3.1	0.37	1.38	23.7
Dermatology	0.94	1.30	2.0	0.45	1.93	51.5
Gastroenterology	1.00	1.73	0.0	0.50	7.41	319.8
General practice	1.00	1.46	0.	0.51	2.60	78.6
General surgery	0.86	1.00	0.1	0.41	1.00	0.2
Internal med.	0.95	1.32	1.5	0.47	2.05	55.5
Neuro. surgery	0.75	1.11	2.7	0.36	1.25	16.1
Obstet./gyn.	0.83	1.29	3.5	0.43	1.86	49.0
Opthalmology	0.79	1.37	7.8	0.38	2.27	78.8
Orthopedic sur.	0.77	1.31	7.0	0.38	1.94	58.5
Otolaryngology	0.84	1.55	9.0	0.41	3.56	150.1
Pediatrics	1.13	1.18	-2.3	0.55	1.47	21.1
Psychiatry	1.02	1.76	-1.8	0.52	7.06	372.4
Urology	0.97	1.09	0.2	0.45	1.22	12.2
Anesthesiology	1.04	0.95	0.2	0.49	0.90	-5.3
Pathology	0.93	0.99	-1.2	0.43	0.97	-1.5
Radiology	0.93	1.06	0.5	0.44	1.14	7.9

Table IV.1.3

Derived and Required Price Elasticities of Demand for Physician Services

ALLERGY									
AGE =		35			50			65	
ETA(Y,H) =		0.136			0.148			0.163	
RHO(GP,M&P) =		0.928	0.446		0.928	0.446		0.928	0.446
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.374	1.415	2.560	1.420	1.468	2.969	1.484	1.542	3.710
0.625	1.278	1.306	1.951	1.310	1.343	2.130	1.353	1.391	2.406
0.750	1.221	1.243	1.684	1.246	1.270	1.793	1.278	1.306	1.949
0.875	1.184	1.201	1.534	1.204	1.223	1.610	1.229	1.251	1.716
1.000	1.157	1.172	1.438	1.174	1.190	1.496	1.195	1.213	1.575

CARDIOL									
AGE =		35			50			65	
ETA(Y,H) =		0.084			0.076			0.066	
RHO(GP,M&P) =		0.785	0.370		0.785	0.370		0.785	0.370
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.202	1.272	1.830	1.179	1.240	1.696	1.152	1.202	1.554
0.625	1.155	1.207	1.569	1.138	1.183	1.489	1.118	1.155	1.399
0.750	1.126	1.166	1.433	1.113	1.148	1.377	1.096	1.126	1.312
0.875	1.106	1.139	1.350	1.095	1.124	1.306	1.082	1.106	1.256
1.000	1.092	1.120	1.293	1.082	1.107	1.258	1.071	1.092	1.217

DERMATOL									
AGE =		35			50			65	
ETA(Y,H) =		0.153			0.162			0.176	
RHO(GP,M&P) =		0.935	0.448		0.935	0.448		0.935	0.448
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.441	1.487	3.161	1.479	1.531	3.621	1.543	1.604	4.682
0.625	1.324	1.355	2.207	1.350	1.384	2.376	1.392	1.431	2.696
0.750	1.256	1.279	1.837	1.276	1.301	1.933	1.307	1.335	2.102
0.875	1.212	1.230	1.641	1.227	1.247	1.705	1.252	1.274	1.816
1.000	1.181	1.196	1.519	1.193	1.210	1.567	1.214	1.232	1.648

Table IV.1.3, cont. (2)

GASTROEN

AGE =		35			50			65	
ETA(Y,H) =		0.328			0.325			0.321	
RHO(GP,M&P) =		1.000	0.501		1.000	0.501		1.000	0.501
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	2.907	2.905	-3.230	2.857	2.855	-3.360	2.793	2.791	-3.551
0.625	2.104	2.103	-20.976	2.083	2.082	-26.254	2.056	2.055	-39.505
0.750	1.777	1.777	7.878	1.765	1.764	7.412	1.748	1.748	6.869
0.875	1.600	1.599	3.974	1.591	1.591	3.868	1.579	1.579	3.736
1.000	1.488	1.488	2.897	1.481	1.481	2.847	1.473	1.472	2.784

GEN PRAC

AGE =		35			50			65	
ETA(Y,H) =		0.199			0.235			0.323	
RHO(GP,M&P) =		1.000	0.509		1.000	0.509		1.000	0.509
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.661	1.661	4.570	1.887	1.887	12.907	2.825	2.825	-3.732
0.625	1.467	1.467	2.666	1.603	1.603	3.817	2.070	2.070	-69.540
0.750	1.361	1.361	2.087	1.456	1.456	2.597	1.756	1.756	6.465
0.875	1.294	1.294	1.806	1.367	1.367	2.115	1.585	1.585	3.631
1.000	1.248	1.248	1.641	1.307	1.307	1.856	1.477	1.477	2.732

GEN SURG

AGE =		35			50			65	
ETA(Y,H) =		0.007			0.001			0.028	
RHO(GP,M&P) =		0.863	0.408		0.863	0.408		0.863	0.408
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.014	1.016	1.035	1.002	1.002	1.005	1.059	1.069	1.159
0.625	1.011	1.013	1.028	1.002	1.002	1.004	1.047	1.055	1.123
0.750	1.009	1.011	1.023	1.001	1.002	1.003	1.039	1.045	1.101
0.875	1.008	1.009	1.020	1.001	1.001	1.003	1.033	1.039	1.085
1.000	1.007	1.008	1.017	1.001	1.001	1.002	1.029	1.034	1.074

Table IV.1.3, cont. (3)

INT MED									
AGE =		35			50			65	
ETA(Y,H) =		0.175			0.180			0.201	
RHO(GP,M&P) =		0.954	0.469		0.954	0.469		0.954	0.469
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.538	1.579	3.929	1.563	1.606	4.288	1.672	1.728	6.956
0.625	1.389	1.415	2.478	1.404	1.432	2.587	1.474	1.508	3.174
0.750	1.304	1.324	1.988	1.316	1.336	2.046	1.366	1.391	2.330
0.875	1.250	1.265	1.742	1.259	1.275	1.780	1.298	1.317	1.958
1.000	1.212	1.225	1.594	1.220	1.233	1.622	1.252	1.267	1.749

NEUROSUR									
AGE =		35			50			65	
ETA(Y,H) =		0.048			0.055			0.184	
RHO(GP,M&P) =		0.750	0.363		0.750	0.363		0.750	0.363
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.106	1.147	1.359	1.124	1.172	1.434	1.582	1.964	-80.502
0.625	1.083	1.114	1.268	1.096	1.133	1.319	1.417	1.646	5.261
0.750	1.068	1.093	1.214	1.079	1.108	1.253	1.325	1.486	3.076
0.875	1.058	1.079	1.178	1.067	1.091	1.209	1.266	1.390	2.373
1.000	1.050	1.068	1.152	1.058	1.079	1.178	1.225	1.325	2.025

OB GYN									
AGE =		35			50			65	
ETA(Y,H) =		0.130			0.150			0.214	
RHO(GP,M&P) =		0.881	0.432		0.881	0.432		0.881	0.432
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.351	1.419	2.514	1.429	1.517	3.278	1.748	1.945	116.217
0.625	1.263	1.309	1.930	1.316	1.375	2.252	1.521	1.636	4.834
0.750	1.210	1.245	1.671	1.250	1.294	1.863	1.399	1.479	2.949
0.875	1.174	1.203	1.525	1.207	1.242	1.659	1.324	1.384	2.307
1.000	1.149	1.173	1.431	1.176	1.205	1.532	1.272	1.321	1.983

Table IV.1.3, cont. (4)

OPHTHAL									
AGE =		35			50			65	
ETA(Y,H) =		0.124			0.160			0.232	
RHO(GP,M&P) =		0.790	0.381		0.790	0.381		0.790	0.381
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.330	1.457	2.864	1.471	1.680	6.243	1.866	2.422	-4.593
0.625	1.248	1.335	2.086	1.344	1.479	3.047	1.590	1.886	38.740
0.750	1.198	1.265	1.766	1.271	1.370	2.272	1.448	1.643	5.314
0.875	1.165	1.218	1.592	1.224	1.301	1.923	1.361	1.505	3.288
1.000	1.142	1.186	1.482	1.190	1.254	1.724	1.302	1.416	2.557

ORTHOSUR									
AGE =		35			50			65	
ETA(Y,H) =		0.117			0.137			0.195	
RHO(GP,M&P) =		0.774	0.377		0.774	0.377		0.774	0.377
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.305	1.434	2.631	1.377	1.549	3.648	1.639	2.017	-30.124
0.625	1.230	1.319	1.984	1.281	1.395	2.385	1.453	1.676	5.766
0.750	1.185	1.253	1.704	1.223	1.309	1.938	1.351	1.506	3.213
0.875	1.154	1.209	1.549	1.186	1.254	1.709	1.287	1.405	2.441
1.000	1.133	1.178	1.449	1.159	1.215	1.570	1.242	1.337	2.069

OTOLARYN									
AGE =		35			50			65	
ETA(Y,H) =		0.225			0.223			0.310	
RHO(GP,M&P) =		0.837	0.414		0.837	0.414		0.837	0.414
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.818	2.161	-11.335	1.805	2.139	-12.731	2.632	3.851	-2.003
0.625	1.563	1.754	7.727	1.555	1.742	7.291	1.984	2.453	-5.013
0.750	1.429	1.558	3.643	1.423	1.551	3.559	1.705	1.975	2236.519
0.875	1.346	1.443	2.644	1.342	1.437	2.606	1.549	1.733	6.981
1.000	1.290	1.367	2.194	1.287	1.363	2.170	1.449	1.588	3.995

Table IV.1.3, cont. (5)

PEDIATRI

AGE =		35			50			65	
ETA(Y,H) =		0.127			0.130			0.145	
RHO(GP,M&P) =		1.128	0.546		1.128	0.546		1.128	0.546
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.340	1.291	1.869	1.351	1.300	1.908	1.408	1.346	2.131
0.625	1.255	1.220	1.592	1.263	1.226	1.615	1.302	1.259	1.738
0.750	1.204	1.177	1.449	1.210	1.182	1.465	1.240	1.207	1.548
0.875	1.170	1.148	1.362	1.174	1.152	1.373	1.199	1.172	1.435
1.000	1.145	1.127	1.303	1.149	1.130	1.312	1.170	1.148	1.361

PSYCHIAT

AGE =		35			50			65	
ETA(Y,H) =		0.338			0.332			0.360	
RHO(GP,M&P) =		1.024	0.516		1.024	0.516		1.024	0.516
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	3.086	2.945	-3.218	2.976	2.847	-3.479	3.571	3.372	-2.525
0.625	2.178	2.120	-20.586	2.133	2.079	-33.375	2.358	2.287	-8.560
0.750	1.820	1.787	7.925	1.794	1.762	7.057	1.923	1.883	14.428
0.875	1.629	1.606	3.984	1.611	1.589	3.783	1.699	1.672	4.944
1.000	1.511	1.493	2.902	1.497	1.480	2.807	1.563	1.543	3.311

UROLOGY

AGE =		35			50			65	
ETA(Y,H) =		0.091			0.061			0.021	
RHO(GP,M&P) =		0.974	0.448		0.974	0.448		0.974	0.448
	ETA	ETA'	ETA"	ETA	ETA'	ETA"	ETA	ETA'	ETA"
ETA(Q,H)									
0.500	1.222	1.230	1.683	1.139	1.143	1.374	1.044	1.045	1.103
0.625	1.170	1.176	1.481	1.108	1.111	1.278	1.035	1.036	1.081
0.750	1.138	1.142	1.371	1.089	1.091	1.222	1.029	1.030	1.067
0.875	1.116	1.120	1.302	1.075	1.077	1.184	1.025	1.025	1.057
1.000	1.100	1.103	1.255	1.065	1.067	1.157	1.021	1.022	1.049

Table IV.1.3, concluded (6)

```
ANESTHES
 AGE =                    35                            50                            65
 ETA(Y,H) =             -0.045                        -0.042                        -0.001
 RHO(GP,M&P) =           1.039     0.485               1.039     0.485               1.039     0.485
               ETA       ETA'      ETA"      ETA       ETA'      ETA"      ETA       ETA'      ETA"
 ETA(Q,H)
      0.500    0.917     0.920     0.844     0.923     0.925     0.852     0.998     0.998     0.996
      0.625    0.933     0.935     0.871     0.937     0.939     0.878     0.998     0.998     0.997
      0.750    0.943     0.945     0.890     0.947     0.949     0.897     0.999     0.999     0.997
      0.875    0.951     0.953     0.904     0.954     0.956     0.910     0.999     0.999     0.998
      1.000    0.957     0.959     0.915     0.960     0.961     0.920     0.999     0.999     0.998


PATHOLOG
 AGE =                    35                            50                            65
 ETA(Y,H) =             -0.014                        -0.009                        -0.009
 RHO(GP,M&P) =           0.934     0.432               0.934     0.432               0.934     0.432
               ETA       ETA'      ETA"      ETA       ETA'      ETA"      ETA       ETA'      ETA"
 ETA(Q,H)
      0.500    0.973     0.971     0.939     0.982     0.981     0.960     0.982     0.981     0.960
      0.625    0.978     0.977     0.951     0.986     0.985     0.968     0.986     0.985     0.968
      0.750    0.982     0.980     0.959     0.988     0.987     0.973     0.988     0.987     0.973
      0.875    0.984     0.983     0.964     0.990     0.989     0.977     0.990     0.989     0.977
      1.000    0.986     0.985     0.969     0.991     0.990     0.980     0.991     0.990     0.980


RADIOLOG
 AGE =                    35                            50                            65
 ETA(Y,H) =              0.041                         0.040                         0.043
 RHO(GP,M&P) =           0.926     0.437               0.926     0.437               0.926     0.437
               ETA       ETA'      ETA"      ETA       ETA'      ETA"      ETA       ETA'      ETA"
 ETA(Q,H)
      0.500    1.089     1.097     1.231     1.087     1.095     1.224     1.094     1.102     1.245
      0.625    1.070     1.076     1.177     1.068     1.074     1.171     1.074     1.080     1.187
      0.750    1.058     1.063     1.143     1.056     1.061     1.139     1.061     1.066     1.151
      0.875    1.049     1.053     1.120     1.048     1.052     1.117     1.052     1.056     1.127
      1.000    1.043     1.046     1.103     1.042     1.045     1.101     1.045     1.049     1.109
READY
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The substantive import of the foregoing is that monopoly rents accruing to specialists (relative to general practitioners) could be eliminated (and, as a result, specialist fees and earnings could be reduced by 1 - f, i.e., by up to 25 percent in the case of the high- monopoly- rent specialties) without incurring reductions in specialist work effort if, as a result of increased competition, price elasticities of demand confronting specialists were increased by at most 10 percent. To eliminate monopoly rents of physicians (by comparison to mean PTM earnings), and hence to reduce fees and earnings by rougly 50 percent or more, would not result in reductions in marginal wage rates if price elasticities of demand rose by at most 50 percent in all specialties other than gastroenterology and psychiatry, for which 300 to 400 percent increases in price elasticities would be required. Thus, in general, it would not be necessary to engineer a "perfectly competitive" market in order to reduce physician fees dramatically without incurring the costs of significant reductions in physician work effort.

That the same general conclusions can be reached with reference to the other relatively high earning professional, technical and managerial occupations is clearly indicated by the following summary:

	f	η'	% change
Accountants	0.99	9.53	5.4%
Architects (*)	0.96	8.38	27.4
Engineers	0.93	4.32	24.5
Lawyers	0.86	1.73	11.1
Librar., soc. sc.(**)	0.94	12.51	71.4
Math. specialists	0.96	0.92	-0.3
Hlth. professionals	0.69	0.74	-8.1
Physicians	0.71	3.09	51.1
Bank officers	0.90	3.77	28.7
Hlth.&ed. admin.	0.97	2.08	3.0
Oth. man./admin.	0.94	1.48	2.7

*: $\cdot_{Q,H} = 0.875$ **: $\cdot_{Q,H} = 1.0$

Table IV.1.4

Derived and Required Price Elasticities of Demand for Occupational Services

ACCOUNT						
AGE =	35		50		65	
ETA(Y,H) =	0.727		0.667		0.623	
RHO =		0.994		0.994		0.994
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	-2.203	-2.158	-2.994	-2.919	-4.065	-3.937
0.625	-6.127	-5.859	-14.881	-13.503	312.504	-311.776
0.750	32.609	40.923	9.036	9.528	5.906	6.098
0.875	5.912	6.105	4.207	4.295	3.472	3.528
1.000	3.663	3.727	3.003	3.042	2.653	2.681

ARCHITEC						
AGE =	35		50		65	
ETA(Y,H) =	1.264		0.742		-0.394	
RHO =		0.963		0.963		0.963
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	-0.654	-0.615	-2.066	-1.848	0.559	0.550
0.625	-0.978	-0.909	-5.342	-4.292	0.613	0.604
0.750	-1.459	-1.333	93.750	-36.378	0.656	0.647
0.875	-2.249	-1.999	6.579	8.383	0.690	0.681
1.000	-3.788	-3.197	3.876	4.360	0.717	0.710

ENGINEER						
AGE =	35		50		65	
ETA(Y,H) =	0.556		0.534		0.709	
RHO =		0.926		0.926		0.926
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	-8.929	-4.992	-14.706	-6.543	-2.392	-1.885
0.625	9.058	25.165	6.868	12.864	-7.440	-4.454
0.750	3.866	5.005	3.472	4.321	18.293	-48.967
0.875	2.743	3.184	2.566	2.930	5.271	7.977
1.000	2.252	2.501	2.146	2.361	3.436	4.261

LAWYERS						
AGE =	35		50		65	
ETA(Y,H) =	0.667		0.282		0.384	
RHO =		0.857		0.857		0.857
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	-2.994	-1.799	2.294	2.922	4.310	9.583
0.625	-14.881	-4.089	1.822	2.111	2.593	3.528
0.750	9.036	-26.920	1.603	1.781	2.049	2.482
0.875	4.207	9.008	1.476	1.602	1.782	2.048
1.000	3.003	4.502	1.393	1.490	1.623	1.811

Table IV.1.4, cont. (2)

LIBSOCSC

AGE =	35		50		65	
ETA(Y,H) =	1.456		0.863		-0.422	
RHO =		0.938		0.938		0.938
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	-0.523	-0.475	-1.377	-1.190	0.542	0.526
0.625	-0.752	-0.674	-2.626	-2.118	0.597	0.581
0.750	-1.062	-0.935	-6.637	-4.410	0.640	0.625
0.875	-1.506	-1.292	72.917	-19.419	0.675	0.660
1.000	-2.193	-1.811	7.299	12.509	0.703	0.690

MATHSPEC

AGE =	35		50		65	
ETA(Y,H) =	0.427		-0.066		-0.219	
RHO =		0.956		0.956		0.956
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	6.849	9.399	0.883	0.879	0.695	0.686
0.625	3.157	3.507	0.904	0.900	0.741	0.732
0.750	2.322	2.474	0.919	0.916	0.774	0.766
0.875	1.953	2.043	0.930	0.927	0.800	0.792
1.000	1.745	1.808	0.938	0.935	0.820	0.814

HLTHPROF

AGE =	35		50		65	
ETA(Y,H) =	0.164		-0.179		0.013	
RHO =		0.685		0.685		0.685
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	1.488	1.918	0.736	0.657	1.027	1.039
0.625	1.356	1.621	0.777	0.705	1.021	1.031
0.750	1.280	1.469	0.807	0.742	1.018	1.026
0.875	1.231	1.377	0.830	0.770	1.015	1.022
1.000	1.196	1.315	0.848	0.793	1.013	1.019

PHYSICIA

AGE =	35		50		65	
ETA(Y,H) =	-0.093		0.359		0.115	
RHO =		0.707		0.707		0.707
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	0.843	0.792	3.546	-66.562	1.299	1.482
0.625	0.870	0.826	2.350	5.320	1.225	1.352
0.750	0.890	0.851	1.918	3.093	1.181	1.277
0.875	0.904	0.869	1.696	2.381	1.151	1.228
1.000	0.915	0.884	1.560	2.031	1.130	1.194

Table IV.1.4, concluded (3)

BANK OFF						
AGE =	35		50		65	
ETA(Y,H) =	0.614		0.494		0.079	
RHO =		0.896		0.896		0.896
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	-4.386	-2.702	83.334	-9.774	1.188	1.214
0.625	56.818	-10.409	4.771	8.464	1.145	1.164
0.750	5.515	11.546	2.930	3.772	1.118	1.133
0.875	3.352	4.606	2.297	2.702	1.099	1.112
1.000	2.591	3.175	1.976	2.228	1.086	1.097

HLTHEDAD						
AGE =	35		50		65	
ETA(Y,H) =	0.460		0.378		0.453	
RHO =		0.972		0.972		0.972
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	12.500	18.584	4.098	4.495	10.638	14.661
0.625	3.788	4.114	2.530	2.646	3.634	3.928
0.750	2.586	2.709	2.016	2.076	2.525	2.640
0.875	2.108	2.177	1.761	1.800	2.073	2.139
1.000	1.852	1.898	1.608	1.636	1.828	1.872

MAN ADMI						
AGE =	35		50		65	
ETA(Y,H) =	0.402		0.228		0.246	
RHO =		0.942		0.942		0.942
	ETA	ETA'	ETA	ETA'	ETA	ETA'
ETA(Q,H)						
0.500	5.102	6.824	1.838	1.938	1.969	2.093
0.625	2.803	3.152	1.574	1.632	1.649	1.718
0.750	2.155	2.320	1.437	1.476	1.488	1.534
0.875	1.850	1.952	1.352	1.382	1.391	1.425
1.000	1.672	1.744	1.295	1.319	1.326	1.353

Thus, service- price and earnings reductions could be achieved without any reduction in practitioner hours of work if elasticities were increased, with the required increases never exceeding 75 percent.

In summary, the benefits of a procompetitive policy stance can be expected to be substantial. Even in the absence of significant reductions in entry barriers, increased competition would substantially increase marginal wage rates and reduce prices and monopoly rents. With freedom of entry monopoly rents could be eliminated and the work effort of incumbents could be increased through relatively modest increases in the elasticities of demand confronting the practitioner.

Chapter 2

OCCUPATIONALLY OPTIMAL LEVELS OF SCHOOLING

2.1 DERIVATION OF OCCUPATIONALLY OPTIMAL LEVELS OF SCHOOLING

In the previous chapter interoccupational differences in lifetime earnings and implied returns to occupational choice were examined. For purposes of that exercise the modal level of schooling exhibited by incumbents in each occupation was stipulated. Thus, the estimated returns to occupational choice are those which would be expected to be obtained by an individual selecting the occupation and completing the modal level of schooling for the occupation.[1]

This chapter examines the consequences for the present value of occupational lifetime earnings (net of schooling costs) of variations in the level of schooling, deriving an estimate of the optimal level of schooling for each occupation. In one sense this is a straight- forward exercise. The estimated earnings functions can be evaluated at any assumed level of schooling. In conjunction with the stipulated levels of schooling cost utilized in the previous chapter, the net present values of lifetime earnings at all relevant schooling levels can then be derived. Ignoring nonpecuniary

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[1] Although levels of schooling did change over the period 1967 to 1977, most of the observed change can be accounted for by the interoccupational distribution of employment, with relatively little increase in intraoccupational schooling distributions. Thus, for example, controlling for occupation, modal levels of schooling did not increase over this period. For a related discussion of changes in levels of schooling, examining the intra- and inter- industry composition of changes in schooling levels over the period 1929 to 1969, see Dresch (1975 and 1977).

benefits and costs of schooling and of employment, that level of schooling at which the net present value of lifetime earnings is highest will represent the optimal level of schooling for the occupation. Several complexities and ambiguities, however, must be confronted.

Most seriously, in many of the professional, technical and managerial (PTM) occupations relatively little variation in levels of schooling completed is observed. The most extreme instance of this is provided by physicians, vritually all of whom must be classified as having completed 18 or more years of schooling. While the analysis of schooling- earnings relationships is not precluded for any occupation other than medicine, in several others only slight variation in schooling is observed. Thus, in 1977 fewer than five percent of lawyers had completed less than 16 years of schooling, and in only seven PTM occupations (engineering and science technicians, clergy, health technicians, writers et al., public administrators, trade managers, and other managers and administrators) had at least five percent of incumbents completed fewer than 12 years of schooling. Of the eight nonPTM occupations, two (sales and clerical) have fewer than five percent with less than eight years of schooling. In none of the nonPTM occupations had at least five percent of incumbents completed 18 or more years of schooling, and in three (nontransport operatives, transport operatives and nonfarm laborers) fewer than five percent had completed 16 or more years of schooling.

The problem of limited variation in observed levels of schooling is only compounded by the Current Population Survey truncation of schooling levels at 18 or more years. While significant variation in levels of schooling above 18 years is probably exhibited by lawyers, librarians and social scientists, life and physical scientists, health professionals other than physicians,

physicians, clergy, college faculty and health and education administrators, this variation (and its implications for earnings) cannot be identified using the CPS.

Within the limitations imposed by the truncation of the schooling variable and by the inadvisability of extrapolating above or below observed levels of schooling, however, the estimated earnings functions provide the basis for a very rich analysis of earnings- schooling relationships. Thus, schooling is incorporated in an extremely nonlinear form, permitting "credentialling" effects at eight, twelve, sixteen and 18 or more years of schooling and differences in the return to an additional year of schooling across these ranges.

It should be noted, however, that this analysis can provide evidence on returns to schooling and on optimal levels of schooling only for occupational incumbents. Specifically, any effect of schooling on the probability of in fact obtaining employment in any occupation is lost entirely in this analysis, which can examine only returns to schooling conditional on having obtained employment in an occupation. If the labor market were not subject to external constraints, i.e., were freely competitive, this qualification would be unnecessary, since an individual with any level of schooling could, in principle, freely enter any occupation; the failure to observe persons with any level of schooling in any occupation would simply indicate that the unobserved level of schooling was seriously nonoptimal for that occupation, i.e., that earnings at the unobserved level of schooling would be lower than earnings at the observed levels. Clearly, however, the labor market in the United States is not freely competitive but is subject to a plethora of legal or legally- sanctioned constraints, e.g., occupational licensure regulations.

Moreover, these constraints commonly take the form of externally imposed schooling requirements, although schooling itself may have little relationship to occupational performance. In this context, to fail to observe persons with any given level of schooling among an occupation's incumbents need not imply that the unobserved level of schooling would be nonoptimal in a free labor market but may simply indicate that persons with that level of schooling are systematically excluded from the occupation. Similarly, to determine that one level of schooling is optimal for a would- be entrant to an occupation may be seriously misleading if the probability of obtaining entry would be severely reduced if the otherwise "optimal" level of schooling were obtained.

The general implication of the foregoing is that the optimal levels of schooling derived in the following analysis are likely to be biased upward by comparison to the levels which would be optimal in a freely competitive labor market. Simultaneously, however, these "optimal" levels of schooling are probably biased downward in the context of the constrained, highly regulated market which actually exists. Differently stated, the derived optima can be considered upper bounds on the true social optima but lower bounds on the true private optima. The derived, social and private optima would be identical only in the absence of the constraints on occupational choice and entry which in reality are confronted in the labor market.

2.2 SCHOOLING AND THE NET PRESENT VALUE OF LIFETIME EARNINGS

As the first step in the derivation of the optimal level of schooling by occupation, Tables IV.2.1(1) through IV.2.1(3) present estimates of the present value of expected lifetime earnings net of schooling costs for the years 1967, 1972 and 1977, respectively, varying the level of schooling in

each occupation between seven and 20 years. To control for variations in hours of work across occupations, the evaluations of the earnings functions utilize the geometric mean of hours at each age for the 22 professional, technical and managerial occupations in 1977, as derived in the preceeding chapter. Because the geometric mean of hours was derived only for ages 19 and over, it is assumed that hours of work between the ages of 14 and 18 (ages at which persons with between seven and 11 years of schooling would work) equal hours of 19 year olds (the age at which a high school graduate would enter the labor force). For comparison purposes, Tables IV.2.2(1) through IV.2.2(3) provide parallel estimates utilizing actually predicted hours of work at each age in each occupation. As noted, schooling cost assumptions, by level of schooling, are as developed in the previous chapter. For levels of schooling below the college level, out- of- pocket costs of schooling are assumed to be zero.

The evidence of these tables is summarized in Tables IV.2.3(1) through IV.2.3(3), which present various estimates of the optimal level of schooling, and the associated level of net lifetime earnings, for each occupation in each of the three respective years. These tables also indicate the modal level of schooling and the associated level of net lifetime earnings, as derived in the previous chapter. Three alternative estimates of the optimal level of schooling are presented in these tables. The alternatives differ in the assumed lower bound on the optimal level of schooling: seven, 10 and 14 years, respectively. The lower bound is imposed to permit identification of optima which are not below the observed range of schooling in an occupation. Thus, the "appropriate" lower bound is occupation- specific, as will be discussed. In any case in which the optimum is found to be 18 or more years of schooling,

TABLE IV.2.1

Net Present Value of Expected Lifetime Earnings by Years of School, Geometric Mean Hours

(1) 1967

1967 PRESENT VALUES BY YEARS OF SCHOOL

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	237.2	217.4	199.2	182.4	167.0	184.7	175.4	166.5	157.5	179.0	170.9	199.6	187.7	176.3
2	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
3	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
4	223.4	220.6	217.8	214.9	212.0	209.1	206.0	202.8	199.1	213.2	210.4	216.0	203.3	191.1
5	265.1	269.7	274.3	278.9	283.6	288.3	292.8	297.2	301.1	336.4	296.9	285.3	268.7	252.8
6	257.6	212.1	174.5	143.7	118.3	174.1	179.4	184.8	189.9	217.6	239.6	204.5	193.1	182.1
7	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
8	185.2	184.0	182.8	181.6	180.4	179.2	177.8	176.4	174.4	186.1	191.0	193.5	182.5	171.9
9	168.4	171.1	173.8	176.4	179.1	174.0	173.7	173.3	172.4	168.5	157.7	147.4	138.6	130.1
10	147.6	158.4	169.8	182.1	195.2	209.3	224.1	239.9	256.2	269.7	204.7	255.7	241.0	226.9
11	118.6	131.6	146.0	161.8	179.4	198.7	219.8	243.0	268.2	296.1	326.5	306.3	288.4	271.2
12	131.5	129.4	127.3	125.2	123.2	125.8	131.5	137.4	143.1	98.1	111.2	105.2	98.8	92.8
13	233.1	217.1	202.1	188.0	174.8	178.1	169.7	161.6	153.3	148.5	163.5	187.3	175.7	164.7
14	197.0	185.9	175.4	165.5	156.1	178.9	173.5	168.1	162.4	175.2	161.3	178.1	167.5	157.3
15	211.9	203.2	194.8	186.7	178.8	171.2	163.7	156.4	148.9	148.5	167.6	181.7	171.0	160.7
16	212.5	201.8	191.6	181.8	172.5	163.6	154.9	146.6	138.2	141.5	145.6	147.9	139.1	130.7
17	201.1	202.0	202.8	203.6	204.3	203.9	195.9	188.1	180.1	198.3	190.5	172.1	161.6	151.7
18	219.8	207.5	195.9	184.8	174.4	189.4	183.7	178.1	172.1	201.0	219.1	217.5	204.8	192.7
19	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
20	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
21	222.4	215.8	209.4	203.1	196.9	188.9	188.3	187.7	186.4	199.0	200.7	202.3	190.1	178.4
22	235.8	227.3	219.0	211.0	203.2	217.6	216.3	214.8	212.8	231.8	229.9	227.9	214.2	201.2
23	195.6	184.8	174.5	164.8	155.6	178.9	176.2	173.4	170.2	194.7	177.1	160.8	151.3	142.1
24	168.1	162.5	157.0	151.6	146.4	153.3	149.1	144.9	140.3	146.1	144.5	142.8	134.2	126.1
25	179.1	185.5	179.9	174.3	168.9	173.7	170.1	166.5	162.4	158.7	154.8	150.9	141.7	133.0
26	159.1	163.9	159.1	154.4	149.7	155.9	149.7	143.8	137.6	131.8	126.0	120.4	113.1	106.0
27	164.2	166.1	161.4	156.8	152.3	159.0	149.7	140.9	132.0	123.9	116.0	108.5	101.8	95.4
28	127.2	134.6	130.5	126.4	122.4	133.7	127.2	120.9	114.5	108.5	102.7	97.1	90.9	85.0
29	91.3	98.0	96.9	95.7	94.5	104.7	93.9	84.1	74.8	130.8	122.2	114.1	107.0	100.3
30	123.9	131.3	125.3	119.6	114.0	127.6	121.6	115.8	109.8	104.3	98.8	93.6	87.8	82.2

Table IV.2.1, continued
(2) 1972

1972 PRESENT VALUES BY YEARS OF SCHOOL

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	257.4	248.3	239.5	230.9	222.5	214.3	206.1	198.1	189.7	227.9	238.0	249.6	234.7	220.5
2	322.8	304.5	287.1	270.4	254.5	295.2	273.8	253.8	234.4	267.6	224.8	270.6	253.8	237.8
3	234.6	230.0	225.5	221.0	216.5	212.1	207.5	202.8	197.6	212.1	224.7	227.6	214.3	201.6
4	274.9	266.2	257.6	249.2	240.9	232.9	224.7	216.8	208.3	223.8	229.8	224.6	211.1	198.2
5	374.4	362.4	350.8	339.3	328.2	317.2	306.3	295.5	284.2	292.0	295.2	302.6	285.0	268.0
6	408.6	375.9	345.7	317.8	292.0	268.2	246.0	225.5	205.9	252.0	247.3	249.3	234.6	220.6
7	344.9	304.6	269.0	237.4	209.5	203.3	203.1	202.7	201.7	233.3	191.0	229.6	216.0	203.0
8	251.2	239.8	228.9	218.4	208.2	198.5	188.9	179.7	170.2	210.8	213.2	210.8	198.1	186.1
9	219.8	214.4	209.0	203.6	198.4	190.0	186.5	182.9	178.7	166.3	199.0	142.9	134.1	125.7
10	294.0	490.2	302.5	186.7	115.1	199.8	219.2	240.3	262.8	238.5	252.7	286.4	269.7	253.7
11	443.6	417.3	392.4	368.9	346.7	325.6	305.4	286.3	267.6	250.3	233.7	359.0	337.7	317.3
12	200.6	198.9	197.2	195.4	193.6	134.4	130.0	125.6	120.7	110.3	102.3	101.1	95.0	89.1
13	156.4	164.9	173.7	183.0	192.7	173.7	170.3	167.0	162.9	158.2	128.2	130.5	122.5	114.9
14	233.0	211.4	191.8	173.9	157.6	201.0	191.1	181.6	171.8	188.0	207.4	191.4	179.9	168.8
15	250.5	238.7	227.4	216.5	206.1	196.2	186.4	177.0	167.4	203.3	172.8	196.7	185.1	173.9
16	270.0	251.7	234.6	218.5	203.5	189.5	176.1	163.6	151.2	158.2	173.2	171.4	161.1	151.3
17	225.5	220.6	215.7	210.8	205.9	237.2	225.9	215.1	204.0	225.0	206.9	214.2	200.9	188.2
18	294.0	259.4	228.9	201.8	178.0	189.5	186.7	183.8	180.3	192.7	202.3	201.3	189.2	177.7
19	337.5	313.8	291.7	270.9	251.5	228.6	226.8	224.9	222.2	241.8	263.3	249.3	234.1	219.6
20	208.6	214.5	220.6	226.7	232.9	214.3	196.6	180.3	164.5	214.0	199.2	215.9	203.0	190.7
21	238.8	228.4	218.4	208.7	199.4	205.2	207.1	208.8	209.8	230.0	214.7	222.9	209.4	196.5
22	271.5	262.4	253.4	244.7	236.2	249.9	246.4	242.9	238.6	269.5	268.9	252.2	237.0	222.4
23	238.4	224.3	211.0	198.4	186.5	203.6	199.5	195.3	190.4	218.4	218.3	199.9	187.9	176.4
24	189.3	184.0	178.8	173.7	168.7	172.3	168.4	164.4	159.8	158.1	173.5	142.0	133.3	129.9
25	207.9	212.5	202.9	193.8	185.0	194.5	189.2	184.0	178.2	170.5	169.1	167.6	157.3	147.5
26	172.4	178.4	170.8	163.6	156.6	171.1	163.9	156.8	149.4	141.0	137.7	134.3	126.0	118.1
27	188.1	203.3	194.5	186.1	177.9	181.5	171.0	161.0	150.8	141.6	132.7	124.2	116.5	109.1
28	160.7	164.3	159.0	153.8	148.7	163.6	157.1	150.8	144.0	110.2	112.3	114.4	107.2	100.2
29	113.5	106.0	104.8	103.5	107.2	116.3	120.4	124.6	128.3	157.0	155.8	154.5	144.8	135.5
30	139.9	149.9	140.6	131.8	123.6	137.5	136.4	135.1	133.3	133.8	127.1	120.7	113.2	106.0

Table IV.2.1, concluded
(3) 1977

1977 PRESENT VALUES BY YEARS OF SCHOOL

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	272.6	258.4	244.7	231.8	219.4	207.5	196.1	185.1	174.0	213.5	223.0	214.9	202.0	189.6
2	161.8	164.6	167.4	170.1	172.9	175.6	178.0	180.3	182.0	220.5	206.2	192.2	180.8	169.9
3	200.9	201.1	201.3	201.5	201.6	201.6	201.3	201.0	199.9	206.9	214.6	204.6	193.2	182.2
4	260.2	253.8	247.5	241.3	235.2	229.1	222.9	216.8	210.1	228.9	227.9	233.8	220.0	206.7
5	366.1	349.1	332.9	317.2	302.3	287.9	273.9	260.4	246.8	234.0	221.5	260.6	245.0	230.1
6	180.0	182.5	185.0	187.4	189.9	192.3	194.4	196.4	197.7	218.7	217.7	225.4	212.6	200.3
7	245.0	239.7	234.5	229.4	224.3	219.3	214.1	208.9	203.2	221.5	232.6	243.3	229.2	215.7
8	185.9	188.7	191.5	194.2	196.9	199.6	201.9	204.2	205.8	213.3	215.9	200.3	188.4	177.0
9	224.7	216.6	208.8	201.3	194.0	198.1	193.1	188.0	182.5	169.9	165.4	163.7	154.0	144.7
10	199.8	203.5	207.2	210.9	214.7	218.5	222.0	225.5	228.5	275.8	326.0	327.0	307.8	289.9
11	627.0	594.8	564.0	534.5	506.3	479.2	453.1	428.1	403.7	380.7	358.6	337.5	317.4	298.2
12	196.9	181.8	167.9	155.0	143.1	150.3	128.2	109.2	92.3	106.1	101.9	99.8	93.7	87.9
13	209.4	187.1	167.1	149.2	133.2	163.8	162.0	160.1	157.5	159.5	186.4	163.0	152.9	143.2
14	185.5	182.7	179.9	177.1	174.2	171.4	168.3	165.2	161.5	162.9	165.0	169.0	158.8	149.0
15	219.0	210.8	202.8	195.1	187.6	180.3	173.0	165.9	158.4	180.0	173.3	185.3	174.1	163.5
16	249.2	236.7	224.7	213.3	202.4	192.1	182.0	172.3	162.5	161.6	162.8	167.0	157.1	147.7
17	173.4	177.7	181.9	186.2	190.6	217.3	204.0	191.4	178.9	197.9	200.6	190.1	178.3	167.1
18	209.9	200.7	191.9	183.4	175.2	182.9	180.7	178.5	175.6	197.0	191.5	217.6	204.5	192.1
19	280.5	267.1	254.2	241.9	230.0	218.6	207.5	196.7	185.9	236.1	232.5	252.4	237.2	222.6
20	345.0	322.8	301.9	282.3	263.9	246.6	230.1	214.5	199.3	209.2	199.6	217.1	204.2	191.8
21	220.3	210.4	201.0	191.9	183.1	205.9	204.3	202.5	200.1	230.8	227.4	224.7	211.0	198.0
22	229.0	223.2	217.5	211.9	206.4	227.0	226.2	225.3	223.7	251.9	253.6	251.2	236.1	221.7
23	195.9	190.0	184.2	178.6	173.0	205.3	201.7	198.0	193.7	231.8	218.0	204.7	192.4	180.6
24	192.6	185.8	179.2	172.8	166.5	178.8	174.3	169.8	164.8	177.3	169.3	161.5	151.7	142.3
25	198.4	201.5	196.7	191.9	187.2	204.2	201.4	198.5	194.9	186.9	178.6	170.6	160.2	150.3
26	176.3	181.8	176.5	171.4	166.3	186.8	180.6	174.5	167.9	161.7	155.5	149.5	140.4	131.6
27	202.7	207.5	201.5	195.6	189.8	191.8	184.1	176.6	168.7	161.3	154.0	147.0	138.0	129.5
28	166.8	181.6	172.9	164.7	156.7	182.4	175.9	169.6	162.9	156.6	150.3	144.1	135.1	126.3
29	119.2	121.3	116.7	112.1	107.7	124.8	121.9	118.9	115.5	147.4	149.7	151.9	142.6	133.7
30	141.0	144.8	139.3	133.9	128.7	137.4	137.0	136.5	135.3	143.1	134.2	125.7	118.0	110.5

the reported earnings assume precisely 18 years, although this may lend an upward bias to the estimate of the associated net present value of lifetime earnings (understating schooling costs and overstating years of earnings in those cases in which the optimum level of schooling is greater than 18 years).

The dependence of the estimated schooling optima on the assumed lower bound of schooling is clearly revealed by these tables. However, the dependence is seemingly paradoxical, in that the lower the bound, the higher the proportion of occupations for which the estimated optimum is equal to the lower bound. Differently stated, as the lower bound is increased the estimated optimum increases even more. Thus, consider the proportions of the PTM occupations for which the derived optimum is equal to the lower bound (ignoring physicians in 1977 because of the absence of variance in schooling):

Lower bound:	7 years	10 years	14 years
1967	59%	24%	6%
1972	86	50	9
1977	57	41	14

That this seemingly paradoxical result is primarily the effect of extrapolating below the observed range of schooling is indicated by the comparison of the PTM and nonPTM optima when seven years of schooling are imposed as the lower bound. In contrast to the PTM occupations, for which in excess of one half and as many as 86 percent are found to have an "optimum" of seven years, this is true of only two of the eight nonPTM occupations (clerical in all years and sales in 1967 and 1972).

While the dominant explanation for the rise of the optimum above the floor when the floor is increased may be provided by extrapolation below the observed range of schooling, in some cases there may be a substantively valid

TABLE IV.2.2

Net Present Value of Expected Lifetime Earnings by Years of School, Predicted Occupational Hours

(I) 1967

1967 PRESENT VALUES BY YEARS OF SCHOOL

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	233.9	214.5	196.6	180.0	164.7	182.6	173.6	164.9	156.2	178.4	170.0	201.3	189.1	177.[illegible]
2	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
3	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
4	222.3	219.4	216.4	213.4	210.3	207.2	203.9	200.6	196.8	210.9	209.0	213.3	200.6	188.[illegible]
5	263.6	269.6	275.7	281.8	288.0	294.1	300.1	306.0	311.5	360.1	312.8	302.0	283.5	265.9
6	269.7	220.3	180.4	148.1	121.8	159.8	160.0	160.6	161.1	185.9	212.5	178.2	168.0	158.5
7	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
8	178.4	177.7	176.8	175.8	174.8	173.6	172.1	170.5	168.4	181.7	187.9	188.5	177.7	167.4
9	169.0	171.7	174.4	177.0	179.6	173.9	173.0	171.9	170.3	167.0	157.7	148.8	139.8	131.2
10	167.4	177.8	188.9	200.5	212.7	225.5	238.8	252.8	266.9	289.1	221.6	265.4	250.1	235.[illegible]
11	121.8	135.5	150.6	167.4	186.0	206.6	229.2	254.2	281.3	311.5	344.6	330.7	311.3	292.[illegible]
12	124.0	123.3	122.2	120.9	119.3	121.8	126.9	131.7	135.8	93.0	103.1	98.8	92.7	86.9
13	228.5	214.9	201.7	188.9	176.6	178.7	167.1	155.3	143.1	144.7	149.5	186.5	174.7	163.[illegible]
14	192.5	182.3	172.5	163.1	154.1	176.3	170.9	165.6	159.9	173.8	159.5	176.8	166.3	156.3
15	207.2	198.3	189.5	181.0	172.7	164.6	156.5	148.7	140.7	146.7	170.8	185.0	174.6	164.5
16	211.2	200.8	190.7	181.1	172.0	163.2	154.6	146.4	138.1	141.9	146.1	148.9	140.0	131.5
17	201.6	201.2	200.6	199.9	199.1	200.5	192.3	184.2	176.0	195.5	189.1	172.1	161.7	151.7
18	228.0	214.0	200.7	188.2	176.4	189.4	183.3	177.4	171.2	198.4	218.5	219.1	205.9	193.3
19	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
20	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.9	-1.2	-1.5	-1.8	-2.2	-2.5
21	230.3	221.7	213.2	204.9	196.9	191.3	190.5	189.6	188.2	199.5	203.2	206.8	194.1	182.0
22	239.8	231.6	223.4	215.5	207.8	221.6	219.6	217.6	215.0	234.8	232.9	230.8	216.9	203.7
23	188.9	179.4	170.3	161.5	153.0	180.8	177.7	174.4	170.6	197.8	180.0	163.6	154.1	144.9
24	163.5	158.1	152.7	147.5	142.3	151.0	146.5	142.0	137.1	145.7	142.9	140.0	131.7	123.7
25	177.0	184.0	178.2	172.6	167.0	172.6	169.0	165.4	161.4	157.7	153.9	150.0	140.8	132.1
26	155.2	159.9	155.0	150.2	145.5	153.2	147.0	140.9	134.6	128.7	123.0	117.3	110.1	103.2
27	163.2	165.7	161.8	157.8	153.8	162.5	151.6	141.4	131.2	121.9	113.0	104.6	98.1	91.9
28	121.5	129.0	125.1	121.3	117.5	131.4	124.4	117.7	110.8	104.4	98.1	92.1	86.3	80.7
29	93.2	100.8	99.4	97.9	96.3	109.8	97.8	86.9	76.5	135.8	129.2	117.9	110.6	103.7
30	118.1	127.7	121.2	114.9	108.9	127.4	121.4	115.6	109.5	103.9	98.4	93.1	87.4	82.0

Table IV.2.2, continued
(2) 1972

1972 PRESENT VALUES BY YEARS OF SCHOOL

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	250.2	241.9	233.7	225.8	218.0	210.4	202.7	195.2	187.3	227.9	238.4	251.9	236.9	222.5
2	320.9	308.3	289.8	266.1	238.0	295.8	273.8	253.4	233.7	266.1	221.4	268.6	251.7	235.6
3	230.4	226.4	222.4	218.2	213.9	209.6	204.9	200.2	194.9	209.2	220.2	224.7	211.6	199.1
4	272.9	264.1	255.6	247.2	239.0	231.0	222.9	215.0	206.7	222.2	227.8	223.1	209.7	196.9
5	383.9	368.5	353.1	337.7	322.3	306.9	291.4	276.1	260.4	304.1	292.4	321.6	303.2	285.5
6	351.6	329.3	308.2	288.3	269.3	251.3	234.0	217.7	201.5	247.5	239.7	252.4	237.6	223.6
7	369.1	319.0	275.7	238.3	205.9	202.8	202.3	201.8	200.5	232.3	188.2	227.0	213.3	200.3
8	242.3	231.5	221.1	211.0	201.2	191.8	182.4	173.4	164.1	203.6	206.6	203.6	191.5	179.9
9	219.9	213.0	206.2	199.5	193.0	187.5	183.3	179.1	174.3	163.3	195.9	138.8	130.2	122.0
10	794.8	492.7	305.1	188.7	116.6	202.2	221.2	241.3	262.1	240.9	254.7	286.3	269.6	253.6
11	445.3	420.2	395.9	372.7	350.4	329.1	308.6	289.1	269.9	252.1	235.2	355.4	334.7	314.8
12	202.3	202.6	202.2	201.2	199.5	138.6	134.1	129.7	124.8	111.8	104.0	102.9	96.5	90.4
13	141.4	152.5	163.9	175.6	187.5	170.5	167.4	164.2	160.3	156.9	124.5	131.0	123.2	115.7
14	226.2	205.2	186.1	168.6	152.7	196.7	186.9	177.5	167.8	184.6	204.0	188.1	176.8	166.0
15	227.8	217.4	207.2	197.4	187.8	178.4	169.2	160.2	150.9	185.9	165.9	191.9	181.1	170.7
16	269.0	250.6	233.5	217.4	207.4	188.3	174.9	162.3	150.0	158.1	173.1	171.3	161.0	151.2
17	224.0	218.3	212.7	207.0	201.4	234.9	222.4	210.4	198.1	225.4	205.5	213.5	200.3	187.7
18	280.3	248.9	221.0	196.1	173.8	183.4	180.7	177.9	174.5	186.9	201.4	198.7	186.7	175.2
19	334.0	310.2	288.0	267.3	248.0	227.0	225.7	224.3	222.2	240.5	269.7	249.3	233.9	219.2
20	206.8	209.9	213.1	216.4	219.7	212.0	195.7	180.5	165.9	212.0	197.3	216.6	203.6	191.2
21	244.6	234.0	223.7	213.7	204.0	210.2	211.8	213.3	214.1	235.4	217.8	224.9	211.2	198.2
22	276.0	266.6	257.4	248.3	239.5	253.6	250.0	246.3	241.9	272.3	271.2	255.4	239.9	225.1
23	234.0	220.7	208.0	195.9	184.3	204.9	200.1	195.2	189.7	219.3	221.0	199.8	188.0	176.7
24	184.3	179.1	174.0	168.9	163.9	170.2	165.5	160.8	155.5	157.1	167.5	141.0	132.3	124.0
25	204.5	209.9	200.5	191.4	182.6	192.9	187.5	182.2	176.4	169.4	169.4	169.3	158.8	148.9
26	168.5	175.9	168.1	160.6	153.3	169.8	162.0	154.4	146.5	139.4	135.5	131.6	123.4	115.7
27	184.8	198.8	191.1	183.7	176.4	181.0	170.3	160.2	149.9	140.6	131.6	123.0	115.4	108.2
28	151.4	155.9	150.7	145.6	140.5	160.6	152.6	144.7	136.5	108.2	113.9	119.2	111.6	104.5
29	115.0	108.6	107.4	106.2	104.9	122.1	125.6	128.8	131.2	162.8	160.1	157.0	147.1	137.7
30	134.2	145.2	136.1	127.5	119.3	137.6	135.3	132.8	129.6	133.6	127.3	121.2	113.8	106.6

Table IV.2.2, concluded
(3) 1977

1977 PRESENT VALUES BY YEARS OF SCHOOL

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	259.4	246.0	233.2	220.9	209.1	197.8	186.8	176.2	165.6	207.2	218.7	209.3	196.7	184.6
2	121.8	127.4	133.2	138.9	144.8	150.6	156.2	161.8	166.8	212.6	187.6	182.2	171.5	161.3
3	197.6	197.8	198.0	198.0	198.0	197.8	197.4	196.8	195.6	201.9	209.7	198.6	187.4	176.6
4	259.3	252.3	245.3	238.4	231.5	224.6	217.6	210.7	203.2	223.4	222.2	229.4	215.7	202.7
5	378.9	360.2	341.9	324.2	306.9	290.2	273.7	257.8	241.8	226.8	212.2	263.4	248.1	233.3
6	143.5	147.7	151.8	155.9	159.8	163.6	167.1	170.4	173.1	199.6	189.7	200.3	189.0	178.1
7	243.0	237.4	231.9	226.4	220.9	215.4	209.8	204.1	198.0	216.0	228.9	241.4	227.2	213.8
8	176.3	180.3	184.0	187.4	190.6	193.5	195.9	198.0	199.4	212.6	215.5	199.0	187.4	176.2
9	207.0	202.4	197.7	192.9	188.0	188.2	182.6	177.1	171.0	160.1	152.0	144.2	135.5	127.2
10	194.0	198.5	203.0	207.5	211.8	216.1	220.0	223.9	227.1	274.7	324.5	325.2	306.4	288.5
11	556.9	538.5	519.5	499.9	480.0	459.8	439.4	419.1	398.4	378.3	358.6	339.4	320.7	302.5
12	214.3	196.9	180.8	165.8	152.0	161.3	136.2	114.7	95.7	111.7	108.7	107.2	100.8	94.6
13	225.4	201.6	180.3	161.0	143.8	181.2	175.0	168.6	161.4	160.8	194.6	169.0	158.1	147.8
14	181.3	178.9	176.3	173.4	170.4	167.1	163.5	159.6	155.1	159.3	162.1	165.5	155.7	146.2
15	208.4	201.6	194.6	187.6	180.4	173.2	165.8	158.4	150.4	183.3	171.3	189.9	179.5	169.4
16	247.5	234.4	221.9	210.0	198.6	187.8	177.2	167.1	157.0	160.1	159.9	165.1	155.3	146.0
17	163.8	167.8	171.7	175.6	179.4	207.0	194.8	183.3	171.6	195.8	193.7	183.2	172.1	161.4
18	186.7	179.9	173.2	166.7	160.3	169.4	166.4	163.3	159.7	182.5	176.3	211.5	198.8	186.7
19	280.6	266.9	253.7	241.0	228.8	217.1	205.6	194.7	183.6	234.6	232.1	254.3	239.0	224.3
20	324.9	304.7	285.6	267.5	250.3	234.0	218.5	203.8	189.3	205.1	200.1	217.5	204.7	192.5
21	222.4	213.7	205.2	196.8	188.6	209.7	207.8	205.7	202.9	234.2	231.4	232.9	218.7	205.2
22	233.9	228.3	222.7	217.1	211.5	231.1	230.1	228.9	227.0	255.2	254.6	253.8	238.5	223.8
23	188.6	183.7	178.8	173.8	168.7	207.5	202.4	197.1	191.2	234.3	219.7	205.8	193.7	181.9
24	178.3	171.1	164.0	157.1	150.3	169.9	163.1	156.3	149.1	168.9	159.6	150.7	141.7	133.0
25	189.6	193.7	188.5	183.3	178.2	197.1	194.2	191.4	187.9	181.5	172.1	163.0	153.0	143.5
26	163.3	172.2	166.5	160.9	155.3	179.1	172.7	166.4	159.7	153.4	147.1	141.0	132.3	124.1
27	196.1	205.9	199.4	193.0	186.7	194.9	184.6	174.7	164.5	155.1	145.8	137.0	128.6	120.6
28	151.4	172.3	161.6	151.4	141.6	176.6	168.0	159.7	150.9	142.7	134.7	126.8	118.9	111.4
29	123.7	129.0	123.4	117.9	112.5	136.8	131.5	125.4	118.3	154.8	159.0	162.9	152.9	143.3
30	129.6	134.9	129.0	123.3	117.6	134.7	132.6	130.3	127.3	140.3	129.9	120.0	112.7	105.7

explanation. Specifically, as higher schooling levels are mandated, it may be rational to obtain schooling even above the mandated level, while lesser levels of schooling would have been optimal in the absence of a mandated level. Thus, for example, in 1977 the optimum for the service occupation was eight years when the floor was set at seven years; but, when the floor was raised to 10 years, the optimum increased to 16 years. Similar phenomena are observed in the clerical occupation in which increases in the floor from seven to ten and from ten to 14 years lead to increases in the optimum from seven to 12 and further to 16 years. In effect, once schooling is forced to rise to ten or 14 years, it becomes optimal to obtain 12 or 16 years, notwithstanding the fact that seven (or fewer) years of schooling were optimal as long as the minimum was less than 10 years. Correspondingly real, as opposed to purely statistical, explanations probably underlie the observed rise of the optimum (in 1977) from 10 to 13 plus years for miscellaneous technicians and from 12 to 17 years for writers, artists and entertainers as the floor is raised from 10 to 14 years.

This finding, that the optimum rises above the floor as the floor itself is raised, has significance on two counts. First, it is often argued that, when observed levels of schooling are above mandatory levels, the existence of minimum mandatory levels can be assumed to have little real impact. In fact, the imposition of the minimum may have had a pronounced effect: The optimum in the absence of a mandatory minimum may well have been substantially below the mandatory minimum, and only as a result of the nonlinearity in the schooling earnings relationship did the above- the- minimum level become optimal when the minimum was imposed.

TABLE IV.2.3

Modal and Optimal Schooling, at Alternative Lower Bounds, Geometric Mean Hours

(1) 1967

1967 OPTIMAL LEVELS OF SCHOOLING. > OR =

	7		10		14		MODE	
1	7	237.2	18	199.6	18	199.6	16	179.0
4	7	223.4	18	216.0	18	216.0	16	213.2
5	16	336.4	16	336.4	16	336.4	19	268.7
6	7	257.6	17	239.6	17	239.6	18	204.5
8	18	193.5	18	193.5	18	193.5	18	193.5
9	11	179.1	11	179.1	14	173.3	14	173.3
10	16	269.7	16	269.7	16	269.7	19	241.0
11	17	326.5	17	326.5	17	326.5	20	271.2
12	15	143.1	15	143.1	15	143.1	18	105.2
13	7	233.1	10	188.0	18	187.3	14	161.6
14	7	197.0	12	178.9	18	178.1	16	175.2
15	7	211.9	10	186.7	18	181.7	20	160.7
16	7	212.5	10	181.8	18	147.9	16	141.5
17	11	204.3	11	204.3	16	198.3	14	188.1
18	7	219.8	17	219.1	17	219.1	14	178.1
21	7	222.4	10	203.1	18	202.3	14	187.7
22	7	235.8	16	231.8	16	231.8	14	214.8
23	7	195.6	16	194.7	16	194.7	14	173.4
24	7	168.1	12	153.3	16	146.1	12	153.3
25	8	185.5	10	174.3	14	166.5	12	173.7
26	8	163.9	12	155.9	14	143.8	12	155.9
27	8	166.1	12	159.0	14	140.9	12	159.0
28	8	134.6	12	133.7	14	120.9	12	133.7
29	16	130.8	16	130.8	16	130.8	12	104.7
30	8	131.3	12	127.6	14	115.8	12	127.6

Table IV.2.3, continued
(2) 1972

1972 OPTIMAL LEVELS OF SCHOOLING. > OR =

	7		10		14		MODE	
1	7	257.4	18	249.6	18	249.6	16	227.9
2	7	322.8	12	295.2	18	270.6	16	267.6
3	7	234.6	18	227.6	18	227.6	16	212.1
4	7	274.9	10	249.2	17	229.8	16	223.8
5	7	374.4	10	339.3	18	302.6	19	285.0
6	7	408.6	10	317.8	16	252.0	18	249.3
7	7	344.9	10	237.4	16	233.3	16	233.3
8	7	251.2	10	218.4	17	213.2	18	210.8
9	7	219.8	10	203.6	17	199.0	14	182.9
10	7	794.0	18	286.4	18	286.4	19	269.7
11	7	443.6	10	368.9	18	359.0	20	317.3
12	7	200.6	10	195.4	14	125.6	18	101.1
13	11	192.7	11	192.7	14	167.0	14	167.0
14	7	233.0	17	207.4	17	207.4	16	188.0
15	7	250.5	10	216.5	16	203.3	20	173.9
16	7	270.0	10	218.5	17	173.2	16	158.2
17	12	237.2	12	237.2	16	225.0	14	215.1
18	7	294.0	17	202.3	17	202.3	14	183.8
19	7	337.5	10	270.9	17	263.3	16	241.8
20	11	232.9	11	232.9	18	215.9	18	215.9
21	7	238.8	16	230.0	16	230.0	14	208.8
22	7	271.5	16	269.5	16	269.5	14	242.9
23	7	238.4	16	218.4	16	218.4	14	195.3
24	7	189.3	10	173.7	17	173.5	12	172.3
25	8	212.5	12	194.5	14	184.0	12	194.5
26	8	178.4	12	171.1	14	156.8	12	171.1
27	8	203.3	10	186.1	14	161.0	12	181.5
28	8	164.3	12	163.6	14	150.8	12	163.6
29	16	157.0	16	157.0	16	157.0	12	116.3
30	8	149.9	12	137.5	14	135.1	12	137.5

Table IV.2.3, concluded
(3) 1977

1977 OPTIMAL LEVELS OF SCHOOLING. > OR =

	7		10		14		MODE	
1	7	272.6	10	231.8	17	223.0	16	213.5
2	16	220.5	16	220.5	16	220.5	16	220.5
3	17	214.6	17	214.6	17	214.6	16	206.9
4	7	260.2	10	241.3	18	233.8	16	228.9
5	7	366.1	10	317.2	18	260.6	19	245.0
6	18	225.4	18	225.4	18	225.4	18	225.4
7	7	245.0	18	243.3	18	243.3	16	221.5
8	17	215.9	17	215.9	17	215.9	18	200.3
9	7	224.7	10	201.3	14	188.0	14	188.0
10	18	327.0	18	327.0	18	327.0	19	307.8
11	7	627.0	10	534.5	14	428.1	20	298.2
12	7	196.9	10	155.0	14	109.2	18	99.8
13	7	209.4	17	186.4	17	186.4	14	160.1
14	7	185.5	10	177.1	18	169.0	16	162.9
15	7	219.0	10	195.1	18	185.3	20	163.5
16	7	249.2	10	213.3	14	172.3	16	161.6
17	12	217.3	12	217.3	17	200.6	14	191.4
18	18	217.6	18	217.6	18	217.6	14	178.5
19	7	280.5	18	252.4	18	252.4	16	236.1
20	7	345.0	10	282.3	18	217.1	18	217.1
21	16	230.8	16	230.8	16	230.8	14	202.5
22	17	253.6	17	253.6	17	253.6	14	225.3
23	16	231.8	16	231.8	16	231.8	14	198.0
24	7	192.6	12	178.8	16	177.3	12	178.8
25	12	204.2	12	204.2	14	198.5	12	204.2
26	12	186.8	12	186.8	14	174.5	12	186.8
27	8	207.5	10	195.6	14	176.6	12	191.8
28	12	182.4	12	182.4	14	169.6	12	182.4
29	18	151.9	18	151.9	18	151.9	12	124.8
30	8	144.8	16	143.1	16	143.1	12	137.4

Secondly, the discrete increases in the optima may have significance in situations of labor market disequilibrium. Thus, consider an individual planning to enter occupation "a", for which the optimal level of schooling is, e.g., 14 years. On completion of 14 years of schooling he finds that the occupation "a" market is seriously depressed and opts to enter occupation "b" instead. Now, if he had planned to enter occupation "b" from the outset, the occupation "b" schooling optimum might have been, e.g., ten years, but, once having already completed 14 years of schooling (as a result of the initial intention to enter occupation "a"), the optimal level of schooling for occupation "b" may be, e.g., 16 years. In this state of labor market imbalance, then, we may observe that many enterants into occupation "b" have 16 years of schooling. However, the true optimum for occupation "b" remains ten years. With the restoration of labor market equilibrium, persons with ten years of schooling again predominate among entrants into occupation "b", while entrants into occupation "a" have 14 years. Thus, paradoxically, a depressed market for relatively highly- educated labor (occupation "a") may, in the short run, lead to increases in the demand for schooling, while restoration of equilibrium may lead to a decline in the demand for schooling. This may provide a partial explanation for the failure of enrollment rates in higher education to decline (or to decline more than they did) in the face of a weakening labor market over the last decade. Once a substantial part of the cost of education became a "sunk cost," it became rational to obtain even higher levels of schooling for entry into occupations for which lower levels of schooling would have been chosen had ultimate occupational destinations been correctly anticipated at the outset but for which even higher levels of schooling are optimal once initial schooling investments have been made.

With reference to the first of the above points, it is difficult to determine to what degree occupational licensure requirements have affected levels of schooling in the PTM occupations. It does seem relatively clear, however, that miscellaneous technicians may be induced to invest in substantially higher levels of schooling than would otherwise be considered optimal as a result of only relatively modest schooling requirements. With reference to the nonPTM occupations it has been argued that a minimum mandatory schooling age of 16 (implying ten years of schooling) has relatively little impact in 1977 because, given the minimum of ten, the optimum level of schooling would exceed ten years in all but one of the eight occupations (transport operatives). In reality, however, the ten year minimum exceeds the seven- year- floor optimum of seven or eight years in three occupations (clerical, transport operatives and service). Thus, the perverse impact of the minimum is substantially greater than might superically be thought. A three year increase in the "minimum" (from seven to ten years) results in a five year increase in the optimum for clerical workers, a two year increase in the optimum for transport operatives, and an eight year increase in the optimum for service workers. In 1967 the impact of mandatory schooling through age 16 was even more perverse but disguised: In seven of the eight nonPTM occupations (the exception being farm laborers) imposition of mandatory schooling increased the optimum from an initial value below ten, but in only one (crafts) was the constrained optimum exactly ten years; in the other six the new optimum would have been 12 or 16 years, or four to nine years higher than the unconstrained optimum. In short, it seems clear that the modal level of schooling observed in the nonPTM occupations reflects not the lack of impact of minimum mandatory schooling laws but rather their magnified impact;

once forced to attend school for ten years, the optimal level of schooling exceeds ten years, but the payoff to the years beyond ten does not compensate for the loss occassioned by the imposition of the requirement of ten years of schooling when the unconstrainted (or, at least, less constrained) optimum was substantially less than ten years.

2.3 CHANGES IN OPTIMAL SCHOOLING LEVELS, 1967 TO 1977

In the remainder of this discussion optimal schooling levels in the professional, technical and managerial occupations will be defined as those obtained when a floor of 14 years of schooling is assumed, while a floor of seven years will be assumed for the nonPTM occupations. It should be kept in mind, however, that this may lend an upward bias to the PTM optima and that the effect of mandatory schooling laws may imply constrained private optima higher than those indicated for the nonPTM occupations.

Over the full decade 1967 to 1977 optimal schooling levels rose in eight PTM occupations and declined in eight others. However, declines predominated in the 1967 to 1972 subperiod, while increases predominated between 1972 and 1977, as the following indicates:

1967-1972				1972-1977				1967-1972			
DECLINES											
Engineering	18+	to	17	Accounting	18+	to	17	Accounting	18+	to	17
Life/phys sc.	18+		17	Architects	18+		16	Architects	18+		16
Clergy	15		14	Computer sp.	18+		17	Computer sp.	18+		17
Hlth. tech.	18+		14	Eng/sc tech.	17		14	Life/phys sc.	18+		17
Oth. tech.	18+		17	Teachers	17		14	Clergy	15		14
College fac.	18+		16					Hlth. tech.	18+		14
Teachers	18+		17					Teachers	18+		14
Trade manag.	18+		16					Trade manag.	18+		16
INCREASES											
Lawyers	16	to	18+	Engineers	17	to	18+	Lawyers	16	to	18+
Lib,soc. sc.	17		18+	Math. spec.	16		18+	Lib,soc. sc.	17		18+
Eng/sc tech.	14		17	Hlth. tech.	14		17	Math. spec.	16		18+
Hlth. prof.	16		18+	Oth. tech.	17		18+	Hlth. prof.	16		18+
				College fac.	16		18+	Writers et al.	16		17
				Writers et al.	16		17	Pub. admin.	17		18+
				Pub. admin.	17		18+	Bank officers	17		18+
				Bank officers	17		18+	Oth. man/ad.	16		17
				Oth. man/ad.	16		17				

Thus, over the ten years optimal schooling levels declined by at least two years and by as much as four years in four PTM occupations (architects, health technicians, teachers and trade managers), while the optimum increased by at least two years in three PTM occupations (lawyers, mathematical specialists and health professionals other than physicians). Finally, in four PTM occupations (engineers, health technicians, miscellaneous technicians and college faculty) declines between 1967 and 1972 were largely or entirely offset by increases between 1972 and 1977, while in one (engineering and science technicians) an increase in the earlier period was offset by a deline in the later period.

If increases in optimal schooling levels in some PTM occupations were offset by declines in others (with the magnitudes of the declines tending to outweigh those of the increases), only increases in optimal schooling levels

are observed over the decade in the nonPTM occupations. While none of the optima changed between 1967 and 1972, between 1972 and 1977 the optimum increased from seven to 15 years in sales, from eight to 12 years in crafts, operatives and nonfarm labor, and from 16 to 18+ years in farm labor. As in the case of the PTM occupations, in short, increases were concentrated in the later part of the period.

2.4 CHANGING RELATIONSHIPS BETWEEN OPTIMAL AND MODAL SCHOOLING LEVELS

Although modal schooling levels by occupation did not shift over the 1967 to 1977 decade, changes in optimal schooling levels served to increase greatly the number of occupations in which modal and optimal schooling levels were equal. Equality of the optimum and mode was true of only three of 25 occupations in 1967, of six of 30 in 1972 and of 11 of 30 in 1977:

Equality of Optimal and Modal Schooling Levels

1967	1972	1977
Life/phys. sc.	Lawyers	Architects
College faculty	Math. specialists	Lawyers
Eng./sc. tech.	Health prof.	Lib., soc. sc.
	Physicians	Eng./sc. tech.
	Hlth. technicians	Health prof.
	Hlth./ed. admin.	Physicians
		College faculty
		Hlth./ed. admin.
		Crafts
		Operatives
		Nonfarm laborers

This increase in the number of occupations in which modal and optimal schooling levels were equal was achieved primarily by a reduction in the number of occupations in which the optimum was below the mode, from 12 of 25 occupations in 1967 to 11 of 30 in 1972 and further to six of 30 in 1977:

Optimal Less than Modal Schooling Level

1967	1972	1977
Lawyers	Lib., soc. sc.	Life, phys. sc.
Lib., soc. sc.	Life, phys. sc.	Clergy
Health prof.	Clergy	Teachers
Physicians	College faculty	Clerical
Clergy	Sales	Trans. operatives
Sales	Clerical	Service
Clerical	Crafts	
Crafts	Operatives	
Operatives	Trans. operatives	
Trans. operatives	Nonfarm laborers	
Nonfarm laborers	Service	
Service		

Clearly, the most notable factor in the decline in the number of occupations with optimal less than modal schooling levels was the rise in optimal schooling levels in the nonPTM occupations, with the number of these occupations exhibiting optima less than modes declining from seven (out of a possible eight) in 1967 and 1972 to only three in 1977. It should also be noted that two of the professional occupations (physicians and lawyers) left this category between 1967 and 1972 not because the optimal schooling level in fact rose over this period, but rather because the optimum became undefinable as the number of incumbents with less than 18+ years of schooling became vanishingly small, precluding the meaningful estimation of the schooling-earnings relationship.

Finally, the relative number of occupations in which the optimum level of schooling exceeded the observed mode remained virtually constant over the period, with 10 of 25 occupations falling into this category in 1967, rising slightly to 13 of 30 in 1972 and 1977:

Optimum Greater than Modal Schooling Level

1967	1972	1977
Accountants	Accountants	Accountants
Engineers	Architects	Computer specialists
Health tech.	Computer special.	Engineers
Other technicians	Engineers	Math. specialists
Teachers	Eng./sc. tech.	Health technicians
Writers et al.	Other technicians	Other technicians
Public admin.	Teachers	Writers et al.
Trade managers	Writers et al.	Public admin.
Oth. man./admin.	Public admin.	Bank officers
Farm laborers	Bank officers	Trade managers
	Trade managers	Oth. man./admin.
	Oth. man./admin.	Sales
	Farm laborers	Farm laborers

Considering only the PTM occupations, in 1967 the optimum exceed the mode in nine of the 17 occupations. This was true in 12 of 22 PTM occupations in 1972 and of 11 of 22 in 1977. At the least, there is little evidence here of optima rapidly outpacing actual levels of schooling.

2.5 OPTIMAL SCHOOLING LEVELS AND OCCUPATIONAL EARNINGS DIFFERENCES

The final step in this examination of optimal schooling levels involves an assessment of the implications of a movement from modal to optimal schooling levels for interoccupational differences in the present value of lifetime earnings net of schooling costs. For purposes of brevity, this examination is restricted to 1977, although the data in Tables IV.2.3(1) and IV.2.3(2) permit the development of comparable assessments for 1967 and 1972.

Clearly, a move from actual (modal) to optimal schooling levels will increase the net present value of expected lifetime earnings in all occupations in which these schooling levels differ. However, the dispersion of earnings may be reduced significantly nonetheless, if the discrepancies between actual and optimal levels of schooling are greatest for relatively low

income occupations and if the earnings gain associated with a move from actual to optimal levels of schooling is relatively great.

The following summarizes the implications of a movement in all occupations from actual to optimal levels of schooling:

Occupation	Optimal - Act. Yrs.	Present Value				Rank Order		
		Opt.	Act.	Δ	%Δ	Opt.	Act.	Δ
Accountants	+1 yr.	$223.0	$213.4	$9.5	4.4%	11	11	
Architects	0	220.5	220.5	0	0	12	9	-3
Computer spec.	+1	214.6	206.9	7.7	3.7	16	12	-4
Engineers	+2	233.8	228.9	4.9	2.1	7	5	-2
Lawyers	0	245.0	245.0	0	0	3	3	
Lib., soc. sc.	0	225.4	225.4	0	0	10	6	-4
Math. spec.	+2	243.3	221.5	21.8	9.8	6	8	+2
Life/phys. sc.	-1	215.9	200.3	15.6	7.8	15	6	+1
Eng./sc. tech.	0	188.0	188.0	0	0	21	19	-2
Health prof.	0	307.8	307.8	0	0	2	2	
Physicians	0	* 293.2	298.2	0	0	* 1	* 1	
Clergy	-4	109.2	99.8	9.4	9.4	30	30	
Health tech.	+3	186.4	160.1	26.3	16.4	23	27	+4
Other technicians	+2	169.0	162.9	6.1	3.7	26	25	-1
College faculty	0	163.5	163.5	0	0	27	24	-3
Teachers	-2	172.3	161.6	10.7	6.6	25	26	+1
Writers et al.	+3	200.6	191.4	9.2	4.8	19	18	-1
Public admin.	+4	217.6	178.5	39.1	21.9	13	23	+10
Bank officers	+2	252.4	236.1	16.3	6.9	5	4	-1
Hlth./ed. admin.	0	217.1	217.1	0	0	14	10	-4
Trade managers	+2	230.8	202.5	28.3	14.0	9	14	+5
Oth. man./admin.	+3	253.6	225.3	28.3	12.6	4	7	+3
Sales	+2	231.8	193.0	33.8	17.1	8	15	+7
Clerical	-5	192.6	178.8	13.8	7.7	20	22	+2
Crafts	0	204.2	204.2	0	0	18	13	-5
Operatives	0	186.8	186.8	0	0	22	20	-2
Transport op.	-4	207.5	191.8	15.7	8.2	17	17	
Nonfarm laborers	0	132.4	182.4	0	0	24	21	-3
Farm laborers	+6	151.9	124.8	27.1	21.7	28	29	+1
Service	-4	144.8	137.4	7.4	5.4	29	28	-1

*: Reported physician net present value downward biased due to truncation.
Δ: Change.

Clearly significant gains would accrue to a move from modal to optimal schooling in a number of occupations. In 14 of the 30 occupations the net present value of lifetime earnings would increase by in excess of five percent, and in six the gain would exceed ten percent. However, the occupations experiencing the largest gain in lifetime earnings are as likely to be *ex ante* high income occupations as low income occupations. Because the highest income occupations would experience no gain, the dispersion in lifetime earnings across occupations would be somewhat reduced, but the reduction would be relatively minor by comparison to the substantial *ex ante* variation. In short, achievement of optimal intraoccupational schooling levels would only marginally reduce the interoccupational dispersion of lifetime earnings.

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